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ABSTRACT

The open-systems model of instructional development (ID) proposed for use in both educational and non-educational organizations is based on an extensive examination of ID, the systems and communication/consulting literature, and the results of a nationwide survey of 750 currently active ID professionals in both higher education and business/industry regarding ID process behaviors. The survey focused on 26 behaviors that may be practiced in the process of developing instruction. Respondents indicated the percentage of time they currently practice each behavior and the percentage of time they feel each behavior should be practiced under "ideal circumstances." Analysis of the 411 usable surveys received (69%) revealed that, while there are isolated differences between education and business respondents, both subgroups follow the same basic ID process, and respondents as a group believe that all 26 ID process behaviors should be practiced significantly more often than they currently are. Further research into the ID process is suggested, including field testing and validation of the proposed ID model. A 22-page bibliography and reference list, a glossary, the survey instrument, survey cover and follow-up letters, and correlation matrices are included. (Author/LMM)

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TOWARD AN INTEGRATIVE OPEN-SYSTEMS MODEL OF INSTRUCTIONAL DEVELOPMENT IN EDUCATIONAL AND NON-EDUCATIONAL ORGANIZATIONS

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by

Robert Francis Sullivan

A dissertation submitted to the Faculty of the Graduate School of the State University of New York at Buffalo in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

October 1982

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by
Robert F. Sullivan

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DEDICATION

This dissertation is dedicated to the memory of my father,

Robert F. Sullivan, M.D.

Thanks, Dad.
With Love From
Your Buddy.

ACKNOWLEDGEMENTS

I wish to express my sincere appreciation to the following people, who have helped me in so many ways.

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To my wife, Susan, for more than I can possibly say. You know how I feel.

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ABSTRACT

Sullivan, Robert F., Toward an Integrative Open-Systems Model of Instructional Development in Educational and Non-Educational Organizations, a dissertation submitted to the Faculty of the Graduate School of the State University of New York at Buffalo in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

The writer proposes a model of instructional development (ID) which views the ID process as an open system. The model, it is submitted, may be utilized in both educational and non-educational organizations. Development of the model was based on an extensive examination of ID, systems and communication/consulting literature, and an analysis of a nation-wide survey of currently active ID professionals in both higher education and business/industry regarding ID process behaviors.

Discussion of the relevant literature was comprised of five major sections: Toward a Definition of Instructional Development, Current Trends in ID, Looking to the Future of ID, Application of General Systems Theory to ID, and Models of ID.

The nationwide ID survey focused on twenty-six behaviors which may be practiced in the process of developing instruction. Respondents indicated the percentage of time they currently practice each behavior and the percentage of time they feel each behavior should be practiced under "ideal circumstances." While isolated differences between education and business respondents were identified, it was concluded that both subgroups follow the same basic ID process. In addition, survey respondents, as a total group, indicated that all twenty-six ID process behaviors should be practiced significantly (.05 level) more often than they are currently being practiced.

The proposed operational ID model is composed of three phases: Analysis/Organization, which consists of ten steps; Development, which consists of eleven steps; and Evaluation/Revision, which consists of six steps.

The writer suggests further research into the ID process, including field testing and validation of the proposed ID model.

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Chapter I

INTRODUCTION AND STATEMENT OF THE STUDY

Knowledge must come through action;
you can have no test which is not fanciful,
save by trial.
-Sophocles, in Trachiniae

Introduction

Man has always searched for knowledge. That search has, in turn, led man on another search -- the search for ways in which his accumulated knowledge could be passed on to others. Ever since prehistoric times, man has striven to teach and to learn, to bequeath his accumulated wisdom to those who would follow in an attempt to offset his own mortality. As man's ability to communicate with his fellow man increased, so too did his ability to teach and to learn. Man discovered that he was not alone in his search for knowledge; through his interaction with others, he discovered companions who shared that search.

Today, the search continues. The more we learn, the more we wish to know. As we realize how far we have progressed, so do we realize how far we have yet to go. We continue the search for knowledge which has endured countless millenia. We have increased the efficiency with which we communicate with one another. Temporal, geographical, cultural and linguistic barriers are now permeated by highly sophisticated means for the acquisition, analysis, storage and transfer of information. The computer, only decades old, is quickly becoming one of man's most valuable tools in his search for knowledge. Other technologies, of today and of the future, will contribute to this search in ways as yet unimagined.

Still, we struggle to learn and to help others to learn. As the words of Sophocles testify, we learn through action. We test our ideas as best we can, allowing, in Darwinian fashion, the strongest to survive -- to be tested again. Our ideas concerning learning have been similarly tested. What should be learned? How can it best be learned? Who should learn? How do we know when learning takes place? These questions, and many variations, continue to challenge our best minds. For those involved in the education and training of others, they have become the raison d'être of their professional lives.

How do we most effectively bring about learning in others? The process of deliberately facilitating learning is referred to as "instruction" (from Corey, AECT, 1979, pp. 13-14). The instructional process today is a synthesis of both the artistic and the scientific. Attempts to improve instruction have led to efforts to understand and manage the instructional process more effectively through the use of scientific thought and methodology. This "scientific" approach to the improvement of instruction has recently been given the name "instructional development" -- or "ID" (from Gustafson, 1971, p 1).

Instructional Development, as a discipline, is still very young. Its theoretical roots can be traced to other disciplines (Sprague, 1981) which lend a broad, "systems" perspective to instructional development. The theories, practices and terminology of such areas of study as psychology, sociology, engineering, biology, systems theory, educational technology, communication theory, and others have found a place in ID.

It may be desirable, therefore, to further investigate the nature of instructional development and to review some of the current trends in the field. Chapter II of this study will consider these and other issues.

Context and Approach of the Study

The past two decades have witnessed tremendous change in the practice of instructional development. As evidenced by such publications as the Journal of Instructional Development, Educational Technology, Educational Communications and Technology Journal, Training and Development Journal and others, ID professionals in all kinds of organizations are communicating with one another more than ever before. And yet, instructional development professionals still have major conceptual and operational differences.

These differences are readily apparent when one examines the many models of "instructional design" and "instructional development" now in use (or, at least, in existence). While the necessity for such a large number of models has been questioned (Andrews and Goodson, 1980; Gustafson, 1981), an examination of the models and of the instructional development literature fails to uncover any overt and systematic attempt to model the ID process from an explicitly open-systems perspective. In addition, examination of present ID models reveals that these models have, to varying degrees, failed to accurately reflect recent trends in the ID field. Additionally, no evidence was found to support the notion that any of these models are based on an analysis of what instructional development professionals are actually doing -- and feel should be done -- regarding the ID process. This present research, and a resulting proposed ID model, will be an attempt to overcome these deficiencies.

This present study will focus on the following questions:

1. To what extent does the process of instructional development (ID) differ in its actual practice in higher education from its practice in business/industry?
2. To what extent do ID professionals in higher

education differ from those in business/ industry regarding the instructional development process as it "should be" practiced under "ideal circumstances"?

3. What significant differences, if any, exist between the instructional development process as it is now practiced and as it "should be" practiced under "ideal circumstances" by ID professionals in higher education and in business/industry?

The ID literature suggests several areas of discussion as particularly relevant to an understanding of the ID field. The integration of various theories with instructional development practices, the desirability of facilitating cooperation between ID practitioners in educational and non-educational organizations, the competencies needed by instructional developers, the demands of productivity, and the role of the instructional developer as organizational change agent are issues which will be examined in terms of their present and future significance to instructional development practices.

General Systems Theory, especially open-systems theory, has had a significant impact on the theory and practice of instructional development (Dick and Carey, 1978; Duncan, 1978; Gagné and Briggs, 1979; Gustafson, 1971, 1981;

Razik, 1969, 1972). The applications of GST and, particularly, of open-systems theory to instructional development will be examined.

The instructional development process has been modeled by many (Andrews and Goodson, 1980; Gustafson, 1981). Some of these models implicitly take a systems perspective. A representative sample of these systems ID models will be presented.

This researcher, as a part of this study, will conduct a survey of currently active instructional development professionals in order to determine the behaviors now being practiced in the ID process, as well as the behaviors respondents feel should be practiced under "ideal circumstances." Respondents will be selected from a national sample of both educational and non-educational organizations.

From a synthesis of the literature examined in this present study and the results of the instructional development survey, an open-systems model of instructional development will be constructed for use in both educational and non-educational organizations. First, a conceptual model will be presented. This will be followed by the operational "integrative open-systems model of instructional development in educational and non-educational organizations."

This present study will conclude with a set of recommendations for further study.

Organization of the Following Chapters

Chapter II of this present study summarizes the review of the literature, which is divided into the following major areas of discussion:

1) Toward A Definition of Instructional Development
2) Current Trends in Instructional Development
3) Looking to the Future of Instructional Development
4) Application of General Systems Theory to Instructional Development
5) Models of Instructional Development

Chapter III describes the research methodology, as well as the design of this present study, the development of the research instrument (survey), and the sampling procedures and statistical analysis to be employed.

Chapter IV discusses the findings of the survey data.

Chapter V presents the conclusions and recommendations for further study.

Chapter VI presents a conceptual ID model based on open-systems theory, and a proposed operational ID model.

Definition of Terms

The following terms are defined in order to provide a basis for common understanding in this present study:

Education-- The aggregate of all the processes by means of which a person develops abilities, attitudes, and other forms of positive behavior of positive value in the society in which she/he lives (Good in AECT, 1979, p. 12).

Evaluation-- The process of delineating, obtaining, and providing useful information for judging decision alternatives (Stufflebeam in AECT, 1979, p.112).

Formative Evaluation-- Evaluation of instructional programs while they are still in some stage of development (Scriven in AECT, 1979, p.113).

Instruction-- The process whereby the environment of an individual is deliberately managed to enable him/her to learn to emit or engage in specified behaviors under specified conditions or as responses to specified situations; a specific subset of education (Corey in AECT, 1979, pp.13-14).

Instructional Design-- The part of the instructional development process that is analogous to the Design Function of the Domain of Educational Technology model -- i.e., the generation of specifications for Learning Resources/Instructional System Components. (Not synonymous with, though often confused with, "instructional development" and "instructional product development.") (AECT, 1979, p.20).

Instruction Development-- A systematic approach to the design, production, evaluation, and utilization of complete systems of instruction, including all appropriate components and a management pattern for using them; instructional development is larger than "instructional product development," which is concerned with only isolated products, and is larger than "instructional design," which is only one phase of instructional development. (D&T Committee, AECT, 1979, p.20).

Instructional System-- The total "package" of materials, tests, student guides, and teacher guides that is needed to reach the goals for any instructional unit, course, or curriculum, along with all supporting activities and processes required to operate the system as it was designed to be operated (Briggs, 1977, p. xxi).

Learner-- Any individual engaged in acquiring new skills, attitudes, or knowledge whether with a specified sequence of instruction or a random assortment of stimuli (D&T Committee, AECT, 1979, p.57).

Model-- (theory) A conceptualization in the form of an equation, a physical device, a narrative, or a graphic analog representing a real-life situation either as it is or as it should be. It is not the original situation but a replica of it; the more faithful the replica, the better the model. There are two types: models of -- explanation; models for -- prescription (Silvern, Heinich in AECT, 1979, p.39).

Prototype-- An experimental or untried model for an instructional system or product to be tested to determine those revisions needed to achieve the terminal objectives; it precedes wide-scale use of the system or product for instructional purposes (IDI in AECT, 1979, p.76).

Summative Evaluation-- The design, collection, and interpretation of data and information for a given set of instructional materials for the purpose of determining the value or worth of those materials (Dick & Carey, 1978, p.202).

Training-- An organized procedure by which people learn knowledge and/or skills and/or attitudes for a definite purpose usually related to a job or task(s) to be performed (D&T Committee in AECT, 1979, p.316).

Note: A selected list of systems terminology is provided in Appendix A.

CHAPTER II
REVIEW OF THE RELEVANT LITERATURE
Toward a Definition of Instructional Development

Instructional Development (ID) is a profession in search of itself. Viewed from the perspective of instruction as a generic endeavor, ID is still in its rudimentary stages. Gustafson (1981) attributes the first use of the term "instructional development" (defined as a process for improving instruction) to Dr. John Barson, who directed the Instructional Systems Development project at Michigan State University from 1961 - 1965.

The theoretical roots of instructional development can be traced primarily to three areas: systems theory, educational technology, and behavioral psychology (Sprague, 1981). Systems theory (and the systems approach) evolved from military applications during and after World War II. Educational technology also had its beginnings during the post-World War II era, the concentration being one of utilization of educational audio-visual aids. Behaviorism, which dominated American thinking in educational psychology in the 1950's and 1960's, owed much of its popularity among psychologists to earlier work of B.F. Skinner in operant conditioning.

Sprague (1981) states that all three of these areas have suffered their share of criticism: the systems approach for its alleged rigidity and non-humanistic orientation; educational technology for its alleged overemphasis on audio-visual hardware; and behaviorism for its narrow focus, a criticism which became more intensified after cognitive psychology took the place of behaviorism as the dominant paradigm in educational psychology in the 1970's (p. 24).

While each of these three areas continues to attract a considerable amount of attention and controversy, so does instructional development. Although the past two decades have witnessed tremendous progress, the ID profession is currently confronted by a variety of problematic issues which seriously impede its future advancement.

Braden and Terrell (1978) provide a thought provoking sample of some of the "questions concerning ID that do not yet have agreed upon answers." Among the questions they ask are:

> In understandable terms, what is Instructional Development?
> What is included in the ID process?
> How can we best achieve impact through ID?
> Who sets the goals of ID?
> What are the goals of ID?
> Who sets the priorities for ID projects...?
> Who should work on an ID project? (pp. 216-217)

Certainly, the list is not exhaustive. It does, however, provide a challenging sample of some of the more frustrating questions confronting the ID profession today.

Since the predominant question seems to be that of definition of instructional development itself, it is to this issue that this study now addresses itself.

The Terminology Problem

Bass, Lumsden and Dills (1978) identify the general problem regarding definition in ID, saying:

> The instructional development concept has gained credibility, but has done so without the benefit of a clear understanding within the ranks of our clientele or ... even among ourselves of the nature of instructional development. It is clear that one task which must be undertaken right away is that of defining ourselves. (pp. 232-233)

Various ID special interest groups, such as the Division of Instructional Development (DID) of the Association for Educational Communications and Technology (AECT), have attempted to lead the way in efforts toward this self definition. DID publishes a newsletter as well as a "DID Occasional Paper" series. Its programs at the annual AECT conventions have been qualitatively impressive, and have been among the best attended programs at the conventions. The Journal of Instructional Development, first published in the fall of 1977, has demonstrated a rapid growth of interest in instructional development research and communication among professionals in the ID field.

And yet, there remains to be written a commonly agreed upon definition of instructional development. Durzo (1978) attributes this failure of instructional development practitioners to arrive at a common definition of ID to the different perspectives from which they view instructional development. Instructional developers at a large university, for example, will generally tend to include more factors in their definition than will the producers of commercially available audio-visual packages. Are both practitioners members of the ID profession? Which perspective is "more accurate"? If we are to adhere to Gustafson's (1971) definition of ID as "a process for improving the quality of instruction' (p.1), both of the above questions seem to be answered. Clearly, both the university-based instructional developer and the commercial A-V producer are involved in the ID process as defined by Gustafson. The answer to the second question, whose perspective is more accurate, still remains unanswered. Surely, the temptation of most informed readers would be to favor the broader perspective of the instructional developer But as various authors in the field have cautioned (Durzo, 1978; Braden and Terrell, 1978), there is a fine line separating instructional development (ID) from faculty development (FD) and from organizational development (OD). These three areas are inextricably intertwined in most instructional situations; and yet they are all distinct areas of inquiry and practice, having different goals, different techniques, different models and, of course, different perspectives on instruction. Thus, the instructional developer at the university in the preceeding example could be involved primarily in faculty development, thus having a concomitant perspective of ID.

However, as Gustafson (1971) also points out, "ID is an evolving concept. Each day and each new project add to one's perspective on what ID can be" (p.16).

Braden Terrell (1978) offer other definitions of instructional development. The first is from the AECT Task Force on Definition and Terminology (1977), the only "endorsed" definition:

> INSTRUCTIONAL DEVELOPMENT: A systematic approach to the design, production, evaluation, and utilization of complete systems of instruction, including all appropriate components and a management pattern for using them; instructional development is larger than instructional product development, which is concerned with only isolated products, and is larger than instructional design, which is only one phase of instructional development (Braden and Terrell, 1978, pp. 216-217).

Braden and Terrell then offer a second definition, Braden's definition of ID: "A goal-oriented, self-correcting process for the solution of instructional problems" (p. 217). Braden and Terrell clearly and enthusiastically declare their preference for Gustafson's earlier definition of ID as "a process for improving the quality of instruction" (Gustafson, 1971, p. 1), describing it to be "at once simple and profound.... which speaks to the true goal of most instructional developers" (p. 219).

Durzo, Diamond and Doughty (1979) appear to take a compromise position between Gustafson and the AECT Task Force on Definition and Terminology in offering this definition of ID: "Instructional development is defined here as the systematic design, implementation, and evaluation of instruction (courses, programs, and curricula)" (p.4). As is the case with other prominent authors in ID literature, however, Durzo, Diamond and Doughty are careful to differentiate among instructional development, faculty development, and organizational development. They further specify four major areas under instructional development: organization and administration of instructional development programs, instructional development process and developer-client interaction, instructional design process, and evaluation.

Durzo (1977) provides a useful chart for distinguishing among faculty development, instructional development and organizational development. This chart is shown in Table 1.

In commenting on Gaff's chart, Durzo points out its value as a reference, but specifies that no attempt was made by Gaff to "evaluate the relative effectiveness of each approach in improving the teaching-learning process" (p. 3). Durzo also cautions that instructional development agencies

Table 1. ALTERNATIVE CONCEPTIONS OF INSTRUCTIONAL IMPROVEMENT

	FACULTY DEVELOPMENT	INSTRUCTIONAL DEVELOPMENT	ORGANIZATIONAL DEVELOPMENT
Focus:	Faculty members	Courses or curricula	Organization
Purpose:	Promote faculty growth; help faculty members acquire knowledge, skills, sensitivities, and techniques related to teaching and learning.	Improve student learning; prepare learning materials redesign courses; make instruction systematic.	Create effective environment for teaching and learning; improve interpersonal relationships; enhance team functioning; create policies that support effective teaching and learning.
Intellectual base:	Clinical, developmental, and social psychology; psychiatry, socialization.	Education, instructional media and technology, learning theory, systems theory.	Organizational theory, organizational change; group processes.
Typical activities:	Seminars, workshops, teaching evaluation.	Projects to produce new learning materials or redesign courses; workshops on writing objectives, evaluating students.	Workshops for group leaders or team members, action research with work groups, task forces to revise organizational policies.

SOURCE: J.G. Gaff, Toward faculty renewal. San Francisco: Jossey-Bass, 1975, p.9.

must be careful to appropriately and adequately devote attention to both the development of products and the development of people, a caution also stated by other authors (Sprague, 1981; Durzo, Diamond and Doughty, 1979).

A different approach to the definition of instructional development is offered by Heitland (1981) who metaphorically likens ID to such diverse "processes" as engineering, house building and craft-making (e.g., wood-carving, pottery-making). Heitland also cites newer metaphors for ID, including that of ID as biological system, the ID process as enzymatic biochemical reactions, ID as choreography of a new ballet, the ID process as legal counseling, and, finally, the instructional developer as plumbing contractor, "who is likely to be a system designer today, system analyst tomorrow, and system repair person the next day" (p. 29). While the metaphors discussed are admittedly far from isomorphic of the ID process or the role of the instructional developer, Heitland expresses the hope that such discussions may lead to the continued growth and better understanding of the ID profession.

The terminology problem is not restricted to the basic task of arriving at a commonly held definition of instructional development. There exists a plethora of terms loaded with double-meanings, an abundance of concepts identified by several labels, and many terms (like "instructional development") for which there are almost as many interpretations as there are interpreters. These problems are evidenced when one studies the many models of instructional design and development which exist in the current ID literature. For example, the models differ widely in how they identify behavioral objectives, otherwise known as terminal objectives, performance objectives, instructional objectives, learning objectives, and other labels. Tests are often referred to as assessments, evaluations, analyses, diagnoses, examinations, quizzes and other terms. Later discussion of various ID models will further demonstrate these and other terminology-related problems.

Although the terminology problem has been discussed by various authors in recent years (Braden and Terrell, 1978; Gagnè and Briggs, 1979; Andrews and Goodson, 1980), only recently has any organized effort been made toward solving the problem (AECT Task Force on Definition and Terminology, 1979). Since instructional development is an applied science which draws its theories and practices from a variety of other disciplines, there will always be some degree of confusion over the terminology employed. Further, since ID is impacted so much by the rapid changes brought about by advances in educational technologies, it will continually face the frustration of defining and understanding a major issue just about the time that another issue makes the previous one obsolete.

A Profession Divided

In addition to the previously discussed terminology problems, the astute reader of current ID literature will also sense another serious, and equally frustrating phenomenon: a division within the ranks of ID professionals. The major schism is between those ID practitioners in education - particularly in higher education - and those in training (for the purposes of the present study, business and industrial training). Education charges training with a lack of and disregard for theoretical support for ID practice. Conversely, training accuses the "academics" with an ignorance of the realities which confront the ID practitioner in the application of theory. While there is a strong element of a latent status struggle existing beneath the surface of this "theory versus practice" conflict, the status issue is real enough and serious enough to cause some ID professionals to question the readiness of education and training to unite under the same professional banner (Ricks, 1980). Nevertheless, the issue has raised much serious and often heated discussion in recent ID literature (Bass, Lumsden and Dills, 1978; Braden and Terrell, 1978; Patton, 1980; Ricks, 1980, Silber, 1978). Such attention lends credence to the hypothesis that the instructional development profession is finally preparing itself for a systematic, collective effort to solve this problem. This movement toward unification of the ID profession is just one of the current trends which dominate instructional development literature. It is toward these trends that the present study now directs its attention.

Current Trends in Instructional Development

The Integration of Theory with Practice

As was previously stated, instructional development is an applied science. It draws upon many other disciplines for its theoretical framework, synthesizing and accommmodating what it assimilates to instructional settings for the maximization of learning. As in any endeavor where practice is predicated upon a theoretical base, ID practitioners recognize the necessity of staying in touch with current literature in learning theory, instructional design techniques, instructional technology, educational psychology, research methodology, economics, and a myriad of other areas.

The instructional developer, no matter where he may be employed, must deal with a variety of content "experts." Therefore, in addition to being well-grounded in such areas of those listed above, the developer must also possess an intellectual flexibility that will allow him to work effectively with clients from many distinct content areas.

The desired result of the utilization of this knowledge and flexibility, of course, is to have a positive impact upon the learners with whom the ID client interacts. As Braden and Terrell (1979) submit, "Impact is an issue which cannot be avoided in instructional development. All of the ID theorists and practitioners are concerned about impact.... and the desire to have a favorable impact unites them all into a select group of very worthy people"(p. 222).

It is this concern with impact upon learning that underlies many recent discussions in the ID literature concerning the application of various theories in the ID process. Wildman and Burton (1981), in their analysis of the needed integration of learning theory with instructional design, express concern that the explicit decisions made in designing the components of instructional systems too often are made with little or no regard to "the implicit assumptions about the process by which people learn" (p. 5). When such decisions are made, the result is often "varying degrees of imcompatibility among the components" (p. 5) of the instructional system. The authors suggest greater attention to the relevance of learning theory in the training of teachers and ID practitioners; greater involvement of those in educational psychology in the ID process; and more explicit communication between ID practitioners and their clients, to include explanation of the theoretical framework (if any) underlying instructional design and development decisions.

The recent ID literature has also witnessed various authors who have attempted to make ID practitioners more cognizant of the connections between the various schools of psychology and the design and development of instruction. Burton (1981) considers the foundations laid by behaviorism and their application to such central ID activities as the specification of measurable objectives, task analysis, the sequencing of instructional events, the selection of presentation formats, and flexibility in student entry levels and the pacing of instruction. While Burton strongly advocates the increased awareness of and application of behavioral technology, it is conceded that other schools of thought, notably the cognitive movement and the developmental psychology movement, must also be accommodated.

Wildman (1981), advocating the need for more emphasis on cognitive theory, claims that although "there has been a vital explosion of new information about the process of instructional design in a few short years," comparatively little effort has been devoted toward "better understanding learners and how they interact with instructional programs" (p. 14). Most of the improvements in instructional design technologies in the 1980's, claims the author, will come about from insightful applications of human learning theory to the ID decision making process. Wildman also provides a brief, clearly focused discussion of the conceptual framework of learners, and how instructional developers must become more involved in "the problem of teaching students how to learn" (p. 16).

Gold (1981) discusses the benefits of understanding and applying a technology of instruction based on developmental psychology. Utilizing knowledge of a learner's intellectual growth, an ID practitioner could "prescribe specific treatments that vary with differences in subject matter, target audiences, and individual learners within target audiences" (p. 6). The author concludes with a list of questions (p. 12) for the instructional designer to consider in developing new instructional materials and sequences of instruction.

Bell (1981) advocates a systematic strategy of instructional design derived from information-processing theory. A more thorough knowledge of how learners receive, code and retain information can be invaluable to the instructional designer in the presentation, sequencing and development of instruction. An example of the application of information-processing theory to the instructional design strategy for the concepts "prejudice" and "discrimination" is presented in Table 2.

Table 2. ANALYSIS OF THE CONCEPTS "PREJUDICE" AND "DISCRIMINATION"

Instructional Design Strategy	Function
(1) Establish the internal connectedness of the concepts. Prejudice ——→ belief ↓ ↓ leads leads to to ↓ ↓ Discrimination (which is) Action	(1) This relationship for the two concepts provides the framework for designing the instruction. The belief/action sequence in used throughout.
(2) Establish the external connectedness of the concepts. Prejudice → prejudgment; bias; stereotype; misjudgment mental set; mental attitude Discrimination → biased treatment; unfair treatment based on prejudgment; denial of opportunities and rewards to members of some group.	(2) Facilitates development of advance organizers. Synonyms already in the student's vocabulary are generated in this step.

SOURCE: M.E. Bell, A systematic instructional design strategy derived from information-processing theory. Educational Technology, March 1981, p. 33.

While the previously discussed works concerning the integration of various psychology movements are worthy of serious consideration, by no means do they represent the only topic area addressed by authors in current ID literature regarding the necessary integration of theory with ID practice. Zsohar, Hegstad, Sullivan and Hug (1981) present the informative findings of an experimental study and its impact upon instructional development process considerations. A group of student nurses, to be trained in performing intravenous infusions, were first divided into two groups. An experimental group was given practice in simulated infusions. A control group received no such practice. The results of the experiment failed to show any significant differences in the two groups either in a cognitive post test or in the ability to perform the infusion on a live subject. The authors point out the value of such experimental research in helping the instructional developer to make informed, data-based decisions about given components of an instructional program. Such capability would serve not only to improve the effectiveness of instruction, but also to provide objective rationale for wiser use of increasingly limited resources.

Wildman (1980) advocates that a systems approach to instructional design be used in conjunction with a sound foundation in learning theory. While most ID practitioners have paid little heed to the systems approach because of its complexity and alleged mechanistic nature, and while many ID practitioners go about their work with no clear idea of the theoretical framework in which they are operating (if any), Wildman discusses at great length the advantages of a systems approach and the benefits that would accrue to the ID profession from more serious attention to instruction in and application of learning theory. The author maintains that the presentation of learning theories in academic contexts has virtually prevented any recognition of their practical applications.

As has been discussed, recent ID literature has devoted a considerable amount of attention to the need for an integration of theory with pratice. Another current trend in the ID literature deals with the division in the ID profession between those practitioners in education and those in training. The discussion, therefore, will now provide a brief sample of what authors in current ID literature propose to do in order to eliminate this division.

The Joining of Forces: Education and Training

If one concedes the previously discussed assertion that institutions of higher education take a predominantly theoretical stance, while training in business and industrial organizations leans heavily toward the pragmatic considerations of instructional development, then the next logical question would be, "What if anything, should be done about this situation?" Clearly, if the current ID literature is to be given any credibility, something does need to be done. But what? Ullman (1969) cautions that higher education has fallen into a dangerous pattern of applying "the classroom system and the pattern of learning experiences that accompanies it.... involving learning events that are segmented, one-way, transient, message-oriented and not under the learner's control" (p. 11). Innovation is hampered by tradition. The standard lecture format, the exposure of students to content with little regard for its relevance or applicability, and often unsound evaluation procedures are too often the rule rather than the exception. In such environments any innovation, particularly one as diametrically opposed to these "traditions" as the conscientious application of current instructional development theory and practice, stands little chance of being adopted. Higher education, the training ground for today's instructional developers, needs to become actively involved in the process of instructional development, not merely produce instructional developers for employment in other agencies and organizations. Bratton (1978) reports a trend in higher education toward the utilization of ID personnel who have absolutely no formal training in the field.

Budgetary considerations have led to short-sightedness, a vision that leads to an attitude on the part of administrators that instructional development is a luxury which is too expensive to be maintained in hard economic times. The reader who is familiar with the role of instructional development staffs in training departments of business and industry will readily see a striking similarity. Many training directors lament that, at budget time, their budget requests are the first to be cut.

If the situation is really as deplorable as the above discussion would lead one to suppose, what can be done?

In the past several years alone, tremendous progress has been made in making both higher education and business aware of instructional development and its value to the entire institution or organization. Bratton (1978) speaks of a growing "curiosity" among administrators and faculty concerning instructional development activities, not only at their own universities, but at other institutions as well.

Perhaps the best way to begin to bring education and business (training) together is to remind ourselves of that which we have in common. Calling to mind Gustafson's (1971) simple definition of ID would be a good beginning. ID, he said, is "a process for improving the quality of instruction" (p. 1). The central focus is on learning -- and on helping others to learn. With that in mind, the "two sides" (education and business) should, at least, discover a common ground from which they can communicate with one another. It could also be pointed out that education and business have an undeniably synergistic relationship. The educational system provides inputs into business in the form of human resources. Business supports the educational system, primarily financially through tax monies, grants, and other means. Each "side" has a vested interest in the success of the other.

Of special interest to this present study is the issue of how higher education prepares instructional developers to be practitioners - whether it be in educational or business settings. Witt (1981) describes forty-three (43) programs leading to a doctorate in instructional technology, representing an increase of 30.3% over the thirty-three (33) programs which existed in 1974. While numbers of faculty and students have remained fairly consistent with those in 1974 (in those institutions having existing programs in 1974), the author notes that "the full effects of the current financial crises in higher education upon doctoral programs in instructional technology are not yet apparent" (p. 206). Witt postulates that increasing numbers of qualified "instructional developers and other media-related professionals may well be required" (p. 206) to help the universities, medical education institutions, business and industrial training agencies, and government training programs to cope with the demands for quality education with increasingly limited resources available.

The preparation of qualified instructional developers is, of course, not the only demand being made upon institutions of higher education. Sinofsky and Knirk (1981) provide several examples of business corporations which now offer their employees degree programs. Arthur D. Little Co., for example, offers an MBA in management. Xerox, IBM, GE and AT&T offer their employees bachelor's degree programs. The authors attribute this situation to the fact that "a gap exists between academic offerings and the needs of business and industry" (p. 38). To help fill this gap, the authors advocate several courses of action, primarily the reexamination of the concept of internships, or "field experiences," for students. The previously discussed synergistic relationship between education and business again becomes apparent. Consider, for example, the effect on business' willingness to provide financial support for a university program which prepares graduates for positions as instructional specialists in non-school settings, such as business, industry and government. Rosenberg (1980) forsees this situation as one of the most viable solutions to the present problem of overcrowding in schools of education; while at the same time providing universities with the feedback they need to modify programs to meet current needs; providing business with entry-level employees who are aware of the needs, goals, and expectations of business; and providing the students themselves with a more meaningful and immediately useful educational experience.

And so, attempts at the "joining of forces" between education and business seem to be surfacing gradually. In personal experience, this present writer, as an instructional developer in a business organization, has already worked directly with university interns, has attended meetings of a local organization whose sole purpose is to facilitate better communication and cooperation between educational institutions and business organizations, and can attest to the success of at least one graduate program in preparing instructional development professionals for the demands of business.

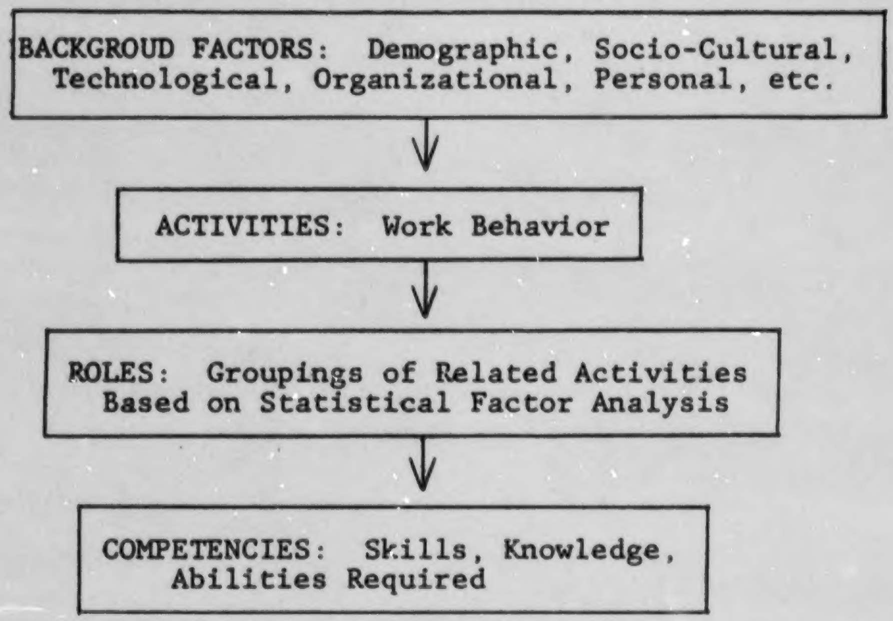
If instructional development is to continue to grow as a profession, of key significance will be the competencies of its professionals. This present study is now directed toward a more detailed discussion of the preparation of and determination of competencies needed by the instructional developer.

Competencies of the Instructional Developer

Pinto and Walker (1978) define "competencies" as "the specific skills, knowledge, abilities, and other attributes such as values and attitudes necessary for the effective performance" (p. 9) of a given role. The above authors define a "role" as "a set activities performed by an individual in fulfillment of the expectations imposed by professional standards of behavior or employer position requirements" (p. 9). A framework to illustrate the relationship among a professional's background, activites, roles and required competencies is shown in Figure 1.

What are the competencies needed by today's instructional developer? The current ID literature devotes a considerable amount of attention to this question. As early as 1968, Faris (reprinted in 1981, p. 17) proposed a list of the competencies and areas of study for an instructional developer. This list is shown in Table 3. If the reader studies the left column of Table 3, which is labeled "Competency," it can be seen that these competencies follow the instructional development process fairly closely. While the elements of this process will be discussed in greater detail in later sections of this study, this point is important when one realizes that using such an approach to the determination of requisite competencies for instructional developers is quite logical. In fact, this approach is used by the other authors cited in this discussion.

Figure 1. A FRAMEWORK FOR DEFINING ROLES AND COMPETENCIES


BACKGROUD FACTORS: Demographic, Socio-Cultural, Technological, Organizational, Personal, etc.
ACTIVITIES: Work Behavior
ROLES: Groupings of Related Activities Based on Statistical Factor Analysis
COMPETENCIES: Skills, Knowledge, Abilities Required

SOURCE: P.R. Pinto and J.W. Walker, A Study of professional training and development roles and competencies. Madison, Wisconsin: American Society for Training and Development, 1978, p.11.

Table 3. COMPETENCIES AND AREAS OF STUDY FOR AN INSTRUCTIONAL DEVELOPER

Competency	Areas of Study
Application of System Design Concepts to Instructional Development	The study of the characteristics of a system approach to instruction and the application of systems methodology in instructional development. (ID) Internship in instructional analysis with emphasis on the first nine steps of the ID flowchart.
Analysis of Learners	Psychology or Educational Psychology with focus on the identification and analysis of learner characteristics relevant to the instructional task. Measurement procedures for identifying learner characteristics
Specification and Evaluation of Educational Objectives	Programming with particular emphasis on writing behavioral objectives. Statistical analysis in discipline that is the "best fit" for the students. Options include Sociology, Psychology, Educational Psychology, Mathematics, and Business.
Analysis and Sequencing of Tasks	Specification of learner behaviors required to achieve objectives and the proper sequencing of these behaviors. Relevant principles extrapolated from the behavioral sciences for sequencing tasks in the cognitive, affective, and psychomotor domains.

Table 3 (continued)

Conceptualization and Application of Instructional Strategies	The theory and practice of curriculum development including theories underlying curriculum development and patterns of curriculum organization. Choosing appropriate strategies for differentiated learning situations. Electronic data processing and its application to the development of instruction. Instructional television design and production. Motivation, perception, and learning theory in the learning and communication processes.
Production of Stimulus Materials	Theory and practice relative to the application of graphic and photographic techniques in effective communication.
Application of Adoption Strategies	Study of proposed models for gaining acceptance of innovations in education. Application of management principles in the administration of Instructional Development program.

For those individuals with the aptitude to undertake a doctoral program in instructional development, the following competency would be added.

Conduct and/or Guide Research and Development Projects	Advanced research methods and design. Advanced statistics. Successful completion of a doctoral study.

SOURCE: G. Faris, Would you believe an instructional developer? Journal of Instructional Development, 1981, 5 (1), p.17. (Reprinted from Audiovisual Directions, November 1968)

The Division of Instructional Development of the Association for Educational Communications and Technology (September, 1980), in its third working draft of ID practitioner competencies, identified "twenty-three functional competencies for instructional development specialists. Within each competency, specific standards were identified which relate to knowledge, performance and evaluation " (p. 1). The list was distributed to AECT/DID members to elicit their feedback. The list was then reduced to sixteen (16) "core competencies" and was published in its "final" form in 1981 (AECT/DID, 1981), culminating a three year project. The authors (members of the DID Task Force on ID Certification) are careful to point out that "the list should never be considered final in the absolute sense, given the evolving nature of the field" (p. 14). The competencies, reflecting the skills of an instructional developer regardless of academic degree, current job or training background, are "performance-oriented rather than academic-oriented" (p. 14) and are reflective of the skills of an ID professional (as opposed to a student of ID). Instructional developers "should be able to perform most if not all of the competencies if given the opportunity to do so" (p. 14). While most of the competencies are broken down into sub-skills, the sixteen core competencies are as follows:

1. Determine Projects Appropriate for Instructional Development
2. Conduct Needs Assessments
3. Assess Learner/Trainee Characteristics
4. Analyze the Structural Characteristics of Jobs, Tasks, and Content
5. Write Statements of Learner Outcomes
6. Analyze the Characteristics of a Setting (Learning Environment)
7. Sequence Learner Outcomes
8. Specify Instructional Strategies
9. Sequence Learner Activities
10. Determine Instructional Resources (Media) Appropriate to Instructional Activities
11. Evaluate Instruction/Training
12. Create Course, Training Package, and Workshop Management Systems
13. Plan and Monitor Instructional Development Projects
14. Communicate Effectively in Visual, Oral, and Written Form
15. Demonstrate Appropriate Interpersonal, Group Process, and Consulting Behaviors
16. Promote the Diffusion and Adoption of the Instructional Development process. (pp. 14-15)

A comparison of the list generated by Faris and that generated by the DID Task Force reveals a great deal of duplication. Since the latter concentrates on core competencies which should be performed by all instructional developers, it excludes certain competencies specifically included by Faris, such as knowledge and application of a systems approach to ID, and the conduct and guidance of research and development projects. Conversely, the DID list specifically includes competencies not explicit in the Faris list. These competencies include: the determination of projects appropriate to ID (#1), analysis of the characteristics of the learning environment (#6), evaluation of instruction/training (#11), effective communication in visual, oral and written form (#14), and demonstration of appropriate interpersonal, group process, and consulting behaviors (#15).

Thus, Faris seems to concentrate primarily an academic-oriented competencies for use by highly-skilled instructional developers in an educational environment; the DID list seems to be more generic, covering a broader range of competencies for application in any environment in which the ID process might be practiced.

Wallington (1981) cites previous studies which attempted to define the competencies needed by the instructional developer, including the previously discussed study by Pinto and Walker (1978). The Wallington article, published before the 1981 DID list appeared in the same journal (i.e., Journal of Instructional Development) only months later, emphasizes the importance of investigating the competencies needed by the instructional developer:

> Instructional development, in attempting to become a profession, is beginning to examine itself more closely. Because a profession emerges from and reflects the activities of practitioners within the field, this self-examination must include the abilities of those practitioners...(p. 28)

Wallington discusses, in some detail, six generic skills (competencies) needed by the instructional developer. Listed in the order in which they are discussed by this author (He does not prioritize the list), these skills are:

1. Interpersonal communication skills
2. Extracting and assimilating chunks of information and working them into a logical (as defined by the subject-matter expert) framework
3. Solving problems, mostly in instructional development
4. Applying principles of the behavioral sciences
5. Systematically searching for related information
6. Learning, keeping up with, using, adapting, and creating instructional development procedures. (pp. 29-32)

Wallington emphatically asserts the need for the instructional developer to assume the dual role of technologist and technician, the former emphasizing the theoretical side of ID, and the latter the applied aspect -- the actual development of "instructional products" (p.29). The above author further suggests placing investigation of generic skills within a framework broader than instructional development. He suggests a framework based on a general psychology model, such as that of Guilford (1967) or Inhelder and Piaget (1958). Wallington (1981) articulates the need for programs which train instructional developers to carefully assess the skills needed, to build its courses and means of measurement on a thorough task classification, and to utilize "the finest of methods to bring its students to the level of both specific and generic skills (whatever levels) specified in the program. If this is not happening, then instructional development as a field and we, as practitioners, are in trouble" (p. 32).

The essential connection between acquistion of needed instructional development competencies and the theoretical and practical considerations involved in training instructional developers is evident. This connection is addressed in current ID literature, various authors discussing the topic from either the perspective of formal educational prerequisites, on-the-job (field) experiences, or a desirable combination of both. Silber (1981) articulates the need for a broad conceptual framework within which to conduct the needs analysis preceding a classficiation of requisite ID competencies. Such a framework, which could be analyzed in terms of an internal "problem solving thought and control process" (p. 33), could be based on general psychological models. The author advocates the model by Piaget (1958) for its relevant application of formal operational thought to ID competencies, and Guilford's (1967) structure of the intellect model. Although Silber feels that the necessary ID cognitive strategies can only be taught indirectly and "over a long period of learning and practice" (p. 33), he feels that proper identification of these cognitive strategies could also serve as screening devices for the selection of students into graduate-level instructional development programs, an admittedly unpopular conclusion, but one which the author believes to be realistic.

Bass and Duncan (1981), pick up on the theme of providing structured field experiences for those students preparing to be instructional developers. The authors cite the success of this concept in the preparation of students for work experience in other fields. Use of both an instructional developer from the university and a liaison person in the field experience agency (almost any level or type educational institution, a business or industrial organization, a health care institution, a government agency, etc.) assure that the student experiences a realistic, worthwhile work situation, and that the student's activities are properly monitored and evaluated. The student, the university, and the institution providing the setting for the guided field experience are all beneficiaries from such a synergistic relationship. Silber (1981) echoes the feelings of other authors previously discussed in this present study (Rosenberg, 1980; Ullmer, 1969; Sinofsky and Knirk, 1981) in pointing out the value of such a synergistic relationship in bringing educational and non-educational institutions together in striving toward attainment of a mutual goal -- learning. The obvious desirability of such a relationship has also been explicitly or implicitly touched upon by other authors who advocate an integration of ID theory and practice (Bell, 1981; Duncan, 1978; Gold, 1981; Wildman and Burton, 1981; just to name a few).

The introduction of guided field experiences, although itself an undertaking of considerable magnitude for those preparing students to become instructional developers, is but one intervention discussed regarding the preparation for and attainment of competencies for instructional developers. Doughty and Durzo (1981) approach the issue of preparation of ID professionals on a much broader level - the redesign of a graduate program in ID. The Instructional Design, Development, and Evaluation (IDDE) program at Syracuse University is used as a model. The increasingly tight financial resources available to universities, the dramatic shift to a more diversified student population (higher percentages of females, older students, and second-career students, for example), and the tremendous expansion of ID-related career opportunities necessitate a closer look at graduate programs which purport to prepare students for the demanding ID job market. Of special note in the Syracuse program are its emphasis on such priorities for instructional development students as building a sound conceptual base for making prescriptive design decisions (again, the integration of theory with practice); the development of leadership through such skills as effective interpersonal communication, problem solving, coordination and consulting; and the infusion of such attitudes as job satisfaction and professional pride.

The need for the essential skill of consulting, discussed in some detail by the authors cited in this study thus far, is further articulated by other authors in the current ID literature (Bratton, 1981; Bunch and Crook, 1981; and Gorr, 1979). Bratton (1981) offers suggestions for the instructional developer who must work with a subject-matter expert (SME) in an unfamiliar content area, and discusses the implications for the training of ID students. Bratton states that, since no single organizing structure exists that provides a framework for the study of any given discipline,he was left with two other alternatives: discovering how experienced instructional developers deal with the task of learning about an unfamiliar content area, or trying to answer the question by drawing an analogy between the instructional developer and "another profession in which the practitioners must learn about a content area through interaction with clients" (p. 22). Ethnography (the study of human cultures) was chosen for the analogy.

The second alternative, that of asking experienced instructional developers how they deal with the problem, led to the conclusion that the technique most used in learning unfamiliar content was that of interviewing the client, or subject-matter expert. Some instructional developers claimed to use a specific strategy or set of strategies for these interviews. Examples given included having specific goals in mind before beginning the interview; using deductive, inductive and inferential questioning strategies; and using analogies.

The third alternative, drawing on analogy between the instructional developer and the ethnographer, uncovered some interesting similarities. Both roles could be viewed as "outsiders" to the area of interest, both rely on interviews as a primary information-gathering technique, and both interviewing situations included the establishment of rapport between the interviewer (instructional developer and ethnographer) and the interviewee (SME or member of culture under study) in addition to (and often preceding) the eliciting of information.

Like Silber (1981), Bratton suggests the use of "screening devices," primarily an evaluation of a student's "intellectual capability" (p. 23), to make decisions on the initial admission of students into graduate ID programs. In addition, Bratton suggests that the following opportunities be provided for students in these programs:

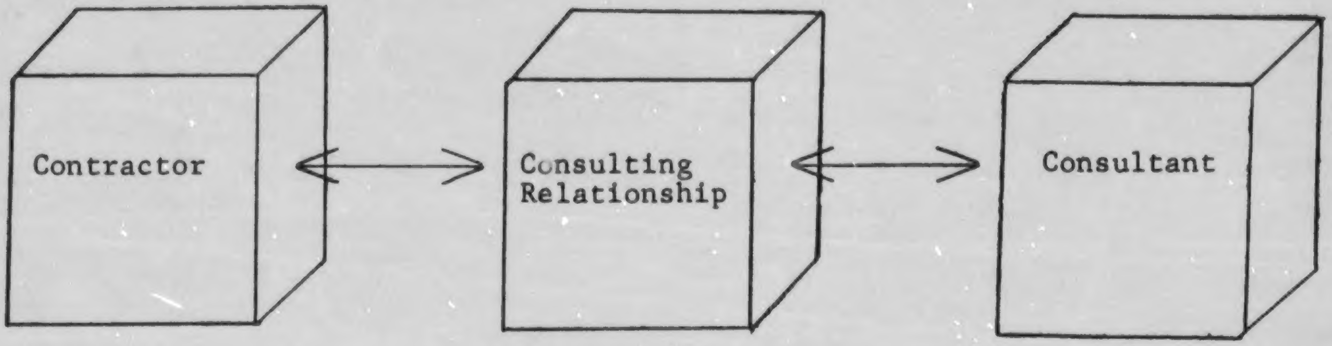
1. Formal study in academic fields outside the area of ID and the College of Education
2. Formal study and discussion of the task of working with unfamiliar content.
3. Formal practice in questioning and interviewing, first in highly structured simulated settings with SME representing various disciplines and later in more realistic complex situations.
4. Internship experiences to observe ID practitioners

> on the job in SME interviews followed by a meeting where the student and the developer discuss the interaction and interview techniques employed by the IDS (instructional development specialist). (p. 23)

Bunch and Crook (1981) describe an approach wherein graduate students in an ID program interacted with undergraduate student teachers in an ID-client simulation. The program, structured and monitored through the Department of Curriculum and Instruction in the School of Education of the University of Virginia, proved to be "highly successful both in terms of the ID course objectives for an early consulting experience and in that it become something of an entry vehicle for establishing the credibility and demand for instructional developers within public school systems" (p. 19).

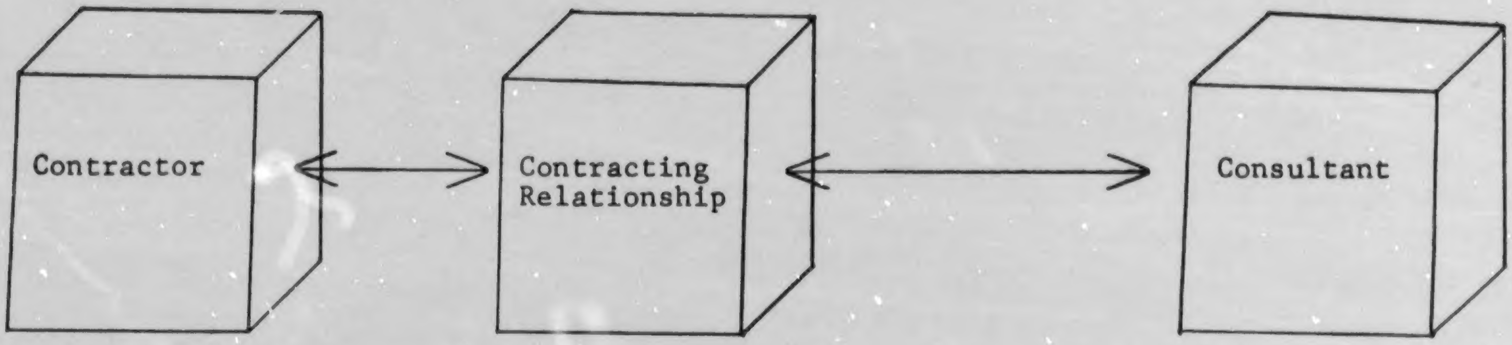
Gorr (1979) offers a model for educational consulting "for the elements common to all consultant-contractor relationship (p. 48). Gorr's model is graphically represented in Figures 2,3, and 4. In Figure 2, the consultant and the contractor (client) have relatively equal input, resulting in a balanced consulting relationship. In Figure 3, the contractor-determined relationship, the concerns of the contractor are reflected more than those of the consultant. Such a situation is likely to exist when the functions and limitations of the consultant are already clearly defined before either party enters into the consulting

Figure 2. BALANCED CONSULTING RELATIONSHIP



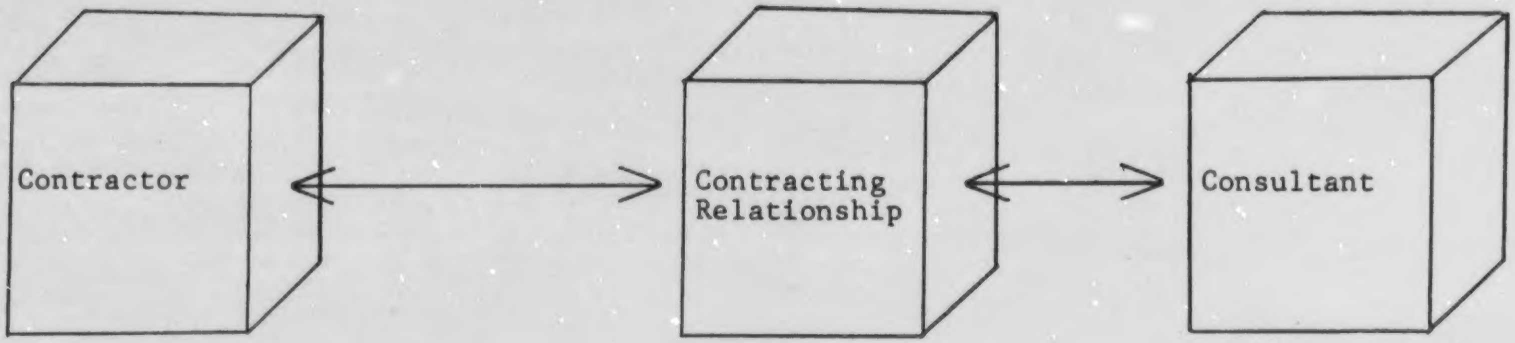
FROM: A. Gorr, A model for educational consulting. Educational Technology, November 1979, p.50.

Figure 3. CONTRACTOR-DETERMINED RELATIONSHIP



FROM: A. Gorr, A model for educational consulting. Educational Technology, November 1979, p.50.

Figure 4. CONSULTANT-DETERMINED RELATIONSHIP



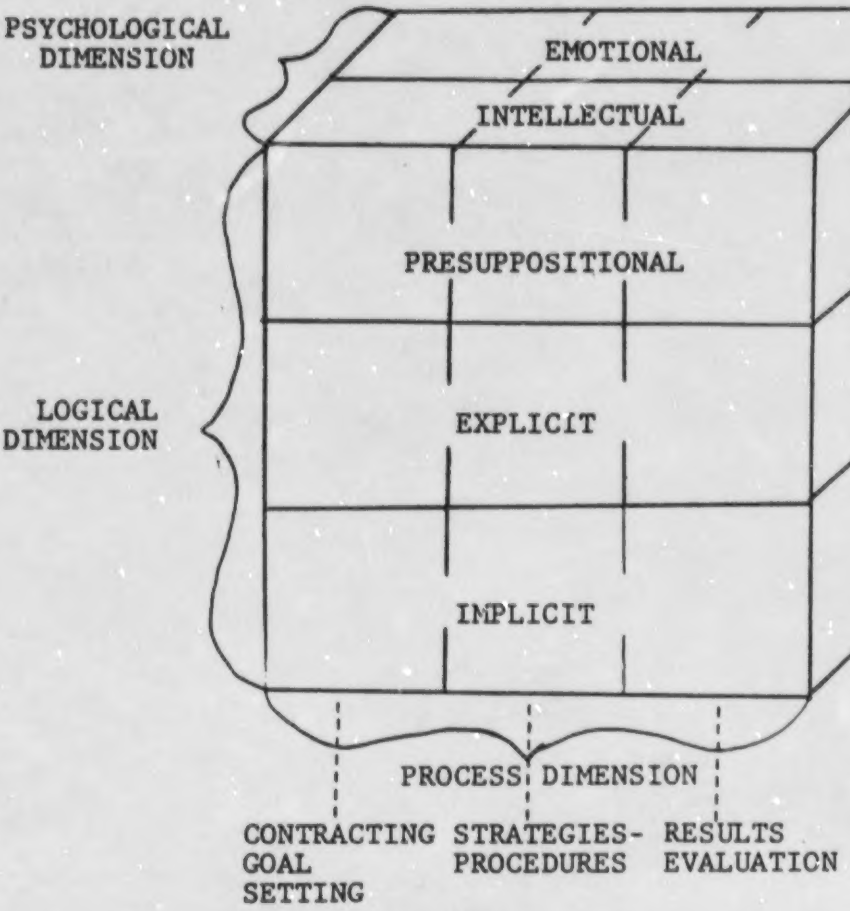
FROM: A. Gorr, A model for educational consulting. Educational Technology, November 1979, p. 50.

relationship. Figure 4 represents the consultant-determined relationship, which is largely representative of the expertise (or personality) of the consultant. Each of the cubes in all three figures (the cubes representing the consultant, the contractor and the consulting relationship) consists of three dimensions. These dimensions symbolize the psychological, logical, and process aspects of consulting. These dimensions are illustrated in Figure 5.

An essential part of any instructional development consulting relationship is the contract between instructional developer (or ID agency) and the client (or client agency). Such a contract may be explicit or implicit, formal or informal, standard in terms of a pre-established relationship or specific to a given ID project. Leitzman et al. (1979) advocate the creation of a project contract in order to "clearly define the roles each participant in [the ID process] will play, the expectations each has of the other, and the goals for which all strive" (p. 23). The authors suggest that the contract be in written form and consist of the following elements:

1. Overview: What is the nature of the project? What needs does it address?
2. Personnel: Who will be involved in the project? What will be their roles?
3. Goals: What do client and consultant seek to accomplish through this project?
4. Objectives: What specific outcomes are dictated by the project's goals?
5. Resources: What is needed to attain the project's goals?

Figure 5. DIMENSIONS IN MODEL FOR EDUCATION CONSULTING



FROM: A. Gorr, A model for educational consulting. Educational Technology, November 1979, p.51.

6. Management: How will the project be administered?
7. Products: What tangible outcomes are expected? Who will "own" them?
8. Evaluation: How will the project be assessed?
9. Renegotiation: How are changes in the project agreement to be made?

(p. 24)

The authors provide some suggestions for the instructional developer concerning the negotiation of the contract elements, as well as a sample contract from an actual ID project. It is concluded that the formal contracting process, while it does not normally constitute a legally binding document (between an internal ID consultant and his client within the same organization), does provide for mutual "ownership" of the project and greater mutual understanding, respect and cooperation between the ID consultant and client.

The model proposed by Leitzman et al. is reaffirmed in a follow-up article by Walter and Earle (1981), who express the need to specify the respective tasks of consultant and client in greater detail than is explained by the previously discussed model. The above authors also suggest when and how to introduce a client to the contracting process and list additional benefits of using contracts not made explicit in the previously discussed model.

Thus far, three current trends in the ID literature have been discussed: the need to integrate theory with practice, the need for a more cooperative relationship between educational and non-educational institutions, and the determination of competencies for and training of instructional developers. This study now concerns itself with a fourth trend in current ID literature - the concern for increased productivity and its impact upon instructional development.

Productivity: Developing Higher Quality Instruction with Curtailed Resources

It is a symptom of the economic environment in which we exist that more is expected, but less is provided with which to get the job done. The development of instruction, in most settings, is no exception. Several specific attempts to increase productivity in both educational and training environments are briefly discussed in the following section.

Livingston (1980) advocates careful attention to the selection, design, development, and evaluation of instructional materials as a first-choice alternative to the more expensive (and often ineffective) strategy of adopting innovative teaching methods and high-technology mediation. Livingston particularly advocates the often overlooked process of clearly defining the instructional problem "in the form of an unambiguously-stated set of instructional objectives" (p. 21). Three further basic steps are proposed: division of an instructional course into smaller units of instruction, preparation of a student study guide for each unit of instruction, and construction of a test for each unit which is based on the previously stated set of instructional objectives. Detailed suggestions for carrying out each of these basic steps are provided. In most situations, claims Livingston, adherence to these basic steps will eliminate the more costly and often ineffective adoption of innovative teaching methodology or the investment in more technologically sophisticated media. While the focus of Livingston's discussion is on educational settings, the principles therein apply to almost any instructional development project.

Pinkstaff (1981), addressing a primarily training audience, offers a "quick and simple program design approach which ... allows you to be more productive, and to prepare and present training sessions that are on target and do not waste time unnecessarily" (p. 66). The program consists of six steps:

> 1. An introduction explaining the purpose and objectives.
> 2. A preview test or grid to introduce the subject and stimulate thinking.
> 3. An article that provides an overview and develops the concepts presented.
> 4. Exercises which provide practice in putting the ideas to work in the participants' situation.
> 5. A review to help participants check up on what they have learned.
> 6. A summary re-stating the major ideas in a few words for quick reference. (p. 68)

The author claims that this approach allows an instructional (training) program to be "developed" in a relatively short period of time and at a minimum expense which is "versatile and personally relevant to each participant" (p. 70). Two final points regarding Pinkstoff's approach need to be made. First, there is no attempt by the author to relate this program to a formal, educational environment. The intended users of the program are "trainers," primarily in business and industry. Second, this approach does not meet the criteria for models of instructional development set forth in a later section of the present study. It is, however, one example of how the demand for increased productivity has impacted the process of designing and developing instruction in non-educational organizations.

In educational institutions, productivity is also a very pressing issue. Bailey and Morrill (1980) discuss a four-step program implemented in the Appoquinimink School District in Delaware in which changes in teacher behavior were brought about as a result of "both in-house research (data collection and feedback) and applications of research (knowledge, utilization, and training)" (p. 41). The program involved both administrators and faculty on both elementary and secondary levels. The pilot study, conducted during the 1978-79 school year, provided a model for a continuous staff development process. Such a continuous process, the authors feel, will contribute greatly to more effective instruction with a minimum investment in new materials through concentration on the improvement of teaching style, instructional content modification, and evaluation techniques.

Osterman (1979) discusses the cost-effectiveness of training university faculty in instructional development procedures. Osterman also discusses the difficulties in trying to accomplish this training on a one-to-one basis, citing the cost considerations alone as justification for choosing another alternative. Osterman reports on two different projects designed at Oregon State University to "transmit instructional development to a larger set of faculty" (p. 12). The first project, the College and University Teaching (CAUT) Project, is focused on providing "services that will motivate and enable faculty members to design and implement an improved instructional process" (p. 12). A group of approximately thirty (30) university faculty members undergoes a full year of training in the ID process. This training includes four phases: instructional development workshops; a planning period; materials and teaching strategies development; and an evaluation and feedback period. The second project, the Fund for the Improvement of Post-Secondary Education (FIPSE) Project on Professional Development, is focused on training a relatively small number of faculty to assume "change agent" roles in the transmission of instructional development procedures. This project, still underway in the College of Liberal Arts of Oregon State University, trains five faculty members (over two terms) in the following:

1. Instructional design
2. Alternative instructional methods
3. Student learning measures
4. Cognitive learning styles
5. Handling the various clients involved in instructional development
6. Case histories in faculty development
7. Adult life cycles and learning
8. Maximizing the learning. (p. 16)

At the conclusion of the two term (1/2 year) training period, the five "change agents" spend two and one-half years advising their colleagues, and acting as internal instructional development consultants. The training and use of existing faculty members as internal ID consultants has greatly reduced the cost of transmitting instructional development procedures to the university faculty. It has also resulted in greater attention to the ID process, not only among the few faculty "change agents," but among the faculty in general.

Thus far, four specific approaches have been discussed for increasing productivity in both educational and non-educational institutions through the application of instructional development programs and procedures. In current ID literature, a controversy exists over how to ensure that instructional development interventions have the greatest possible impact upon the organization. Basically, there are two suggested methods: concentration on a few large-scale ID projects which have the highest probability of success and the highest probability of maximum organizational impact; or "shotgunning," the practice of accepting a large number of instructional development projects, few (if any) of which will receive the detailed, in-depth attention they would get if fewer projects were undertaken. Also, with "shotgunning," the probability of achieving maximum organizational impact is not given high priority in making the decision to accept or refuse an ID project. Braden and Terrell (1978) advocate this approach, as does Heinich (1971). Diamond (1971) is the most outspoken advocate of the "major project" or "concentrated" approach. Diamond feels that projects must be selected carefully, stating.

> Supporting numerous, small projects may make a lot of friends and keep our staff busy, but our long range impact will be minimal. This route takes too long to produce meaningful results. We should select major projects and do them well. Small efforts must be, in effect, pilot case studies designed to form a base for complete course or curriculum design. (p. 7)

The controversy remains unresolved. Which approach ("shotgunning" versus "concentrated") to instructional development is more productive in terms of more favorable impact upon the learning process of members of an organization? Further research into this question is obviously needed, especially in these times of such great concern for productivity.

This section of the present study has examined some of the current trends in the instructional development literature: the need for the integration of theory with practice; the need for a more synergistic relationship between educational and non-educational organizations and instructional development professionals; the need to define a list of competencies required of the instructional developer, and to improve the training of future instructional developers in attaining those competencies; and the demand for increased productivity in both educational and non-educational organizations, the impact of these demands on the instructional development process and practices, and the impact of ID on productivity.

This study now changes its focus from the present to the future in order to briefly examine some issues that are likely to gain (or continue to have) considerable importance in the future literature and practice of instructional development.

Looking to the Future of Instructional Development

The future enters into us, in order to transform itself in us, long before it happens.

- Rainer Maria Rilke, Letters to a Young Poet in

Bartlett, p. 538.

As the words of the poet imply, we do shape our tomorrows by our actions today. So too, in the development of instruction, what is discussed in the literature today will be acted upon -- and further discussed -- in the literature of years to come. In reading about current trends in instructional development, reflective readers will appropriately ask themselves what the journals and the books, the lectures and the coffee room debates, will yield in the future. Certainly, the problems which confront us today are not likely to vanish without a trace. Progress in any discipline is not marked by the turning of a calendar page. Current trends are likely to continue until, as Kuhn (1970) might say, new paradigms take their places. But, for the most part, the future of instructional development will not be determined by any revolutionary phenomena, but by patiently accepting that we must solve the problems of today so that we are ready to solve the problems of tomorrow.

This section of this present study will briefly discuss six areas (problems, if the reader prefers) which are likely to be of great concern in the immediate future of instructional development. These areas are: the unification of the instructional development profession, productivity and accountability, the impact of technology on instructional development, getting the needed organizational support for instructional development, the continuing education of instructional development professionals, and the instructional development professional as organizational change agent.

Unification of the Instructional Development Profession

If instructional development is to mature as a profession, the discord which exists between academia and training (Ricks, 1980) must be overcome. Silber (1978a) advocates the expansion of educational technology to areas outside of higher education (e.g., business and industry). Boutwell (1979) believes that the key to acceptance of the instructional development process and procedures lies in the ability of the profession to generate methods which are flexible enough to adapt to rapidly changing instructional environments, particularly training environments. Boutwell explains that training, to a considerable degree, lost faith in instructional development because the training environment's "social values and costs changed - but the ID process failed to adjust, because there was little variability in the manuals. When you learn only one method and the problem situation changes, the methods must adapt or they become obsolete" (p. 34). In order to ensure that instructional development becomes more adaptive to the needs of various rapidly changing environments, Boutwell advocates acceptance of the systems approach in instructional development and the training of instructional development professionals "in theory-based learning leading to adaptable instructional practices" (p. 35). These measures, it is hoped, will increase the possibilities for increased interaction and cooperation between academia and training.

Patton (1980), as a training director in industry, testifies that "the future of educational technology depends, at least to some extent, on increasing the interaction and breaking down the barriers that often exist between academy and business and industry" (p. 25). Patton also cites the great advances made in training in recent years by the impact of educational technology. Five areas are discussed which, if given serious and concentrated attention, could lead to an even greater impact of educational technology on improved training:

> 1. The time required to develop courses must be shortened without adversely affecting the qualify of the finished product.
> 2. Better means of using subject matter experts (SME's) as educational developers must be devised.
> 3. The world of supervisory and management training must be infiltrated to a greater degree.
> 4. The scope of educational technology must be expanded to include not only the development, implementation, and evaluation of programs but also the maintenance of the desired behavior.
> 5. More research must be done to investigate the characteristics of adult learners, especially those in business and industry, from other learners (pp. 26-27).

Wallington (1980) writes in response to the Patton (1980) article, and submits, "My work is to prepare educational technologists to do the kind of work Patton describes" (p. 28). He also discusses some of the assumptions contained in Patton's article and hopes that, by bringing these assumptions to light, academia and training may become aware of their respective constraints. This, it is hoped, will lead to a more open, honest and productive dialogue.

First, asserts Wallington, it is far easier for training to adapt instruction that it is for education - especially higher education. The regulatory system for higher education often involves governmental agencies at some level. For the universities, these are most often at the state level. Training is less regulated and, therefore, more adaptable. Second, learners in a training environment have more incentive to learn. They are most often paid while they are trained, and their level of compensation is often directly or indirectly related to their successful acquisition and implementation of instruction in the work situation. Third, a learner in a training environment is viewed as "a potentially permanent employee who can be retrained repeatedly" (p. 29). The employee can also be sent outside of the organization for training. Such a situation lends itself to greater investment in the learner and greater flexibility as to the manner, type and scope of instruction. Fourth, most training in business and industry is "directly and specifically job-related" (p. 29). The skills learned are soon applied. In higher education, because of the variety of learners and other complications, "it is almost impossible to make a course specifically job-related" (p. 29). Finally, in training the content is fixed in terms of desired competencies, while the required time is the flexible factor. In formal education, however, the student must master as much as possible within a very strictly defined period of time.

Wallington calls upon instructional developers in both training and education to be sensitive to these and other differences (and the many similarities) between their two environments, and to use this knowledge to strive toward moving "the art and science of instructional development forward" (p. 29).

Finally, Braden and Terrell (1978) place much of the burden for diffusion of instructional development theory and practice on the shoulders of the professional associations and the recognized leaders in ID. The authors charge that "too much of the literature advocates a particular approach, and too little presses for diffusion of the process (of instructional development) in all acceptable forms" (p. 229). The above authors strongly encourage the instructional development field to "devote more of its energies to promoting the profession and less of its energies to elitism and the trappings of professionalism" (p. 229).

The instructional developer in any environment must assume a large share of the responsiblity for the diffusion and implementation of the concepts and practices of ID. Although the authors cited above differ somewhat regarding the specific actions recommended toward this end, they are clearly united in their advocacy of bringing the divided ID profession together. A unified ID profession will be much better equipped to deal with the demands and challenges imposed upon its members.

This present study now turns to one such demand -- the demand for greater productivity and accountability.

Productivity and Accountability

In times of scarce resources, those involved in the development of instruction are faced with increasingly difficult demands. Higher quality instruction must be developed more quickly. Instructional objectives must be clearly stated and results clearly measurable in terms of those objectives. The organization or institution takes a very hard look at its return on investment for instruction. The professional development of instructional staff must often assume a second place status to more "immediate" goals. Course materials, including media, are cut back to include only the "essentials." Basic skills are re-emphasized, and previously offered "enrichment" courses or programs are either reduced or eliminated completely - until "better times." Such are the symptoms of the economic times in which we find ourselves. Whether the instructional developer operates in an institution of higher education or a business setting; whether in a large, multinational corporation or a small, private college; whether in a well-established university or a newly-formed, high technology company, the demands are felt.

The current instructional development literature reflects these constraints on the ID profession in terms of two major demands which are placed on the instructional developer; the demand for increased productivity and the insistence on more accountability for the results of instruction.

Rossett (1981) maintains that the instructional developer can respond to these demands by developing instruction which is more relevant to the needs of learners. Rossett submits that relevant instruction does not limit itself to the immediate application of skills, but also "develops learners who will eventually speculate, contemplate, evaluate, tolerate, embrace, and create. The elements of future and intangible benefit are introduced and supported" (p. 10). Such a view of relevance is comforting to the generalist, who takes a systems approach to education as a multi-disciplinary endeavor. This view should also satisfy even the most pragmatic educator, since relevance for a variety of learner needs cannot be found within the confines of a single course, but must often be attained through a synthesis of outcomes from a sequence of courses. Rossett further maintains that relevance must not be limited to the purposes of instruction, but must apply to the processes of instruction. Identification of learner needs, systematic task analysis and other components of the instructional development process must all be carried out with careful regard for their relevance in the particular situation involved. Rossett proposes five activities as essential to ensuring relevant instruction:

> 1. Select some of the course objectives on the basis of how immediately those skills will be demanded in the student's real world....
> 2. If learners are promised that this or that skill will be demanded in the near future, make sure it happens....
> 3. Encourage current and former students to bear witness in public of eventual applicability....
> 4. Screen each objective for its applicability over time....
> 5. Familiarize students with the idea of relevance in time.... (p. 12)

Rossett concludes by emphasizing the role of the instructional developer in meeting the demand for relevant instruction -- a demand voiced loudly and emphatically by society, legislatures and learners alike.

Osterman (1979), as discussed in a previous section of this chapter, advocates two approaches to dissemination of the instructional development process to university faculty: the training of groups of faculty (as opposed to one individual at a time) in the ID process, and using a small group of faculty "change agents" already trained in the ID process to interact with other faculty in ID activities. The approaches advocated by Osterman seem to complement the ideas for achieving instructional relevance just discussed by Rossett (1981). If individual faculty members are to assume part of the responsibility for increased productivity and more accountability, it would seem advisable to train those faculty in knowledge and implementation of the instructional development process as quickly and as thoroughly as possible.

Edmonds and Pasch (1974) reinforce the contention that individual faculty members must become actively involved in the instructional development process. The above authors assert that American education needs to experience a reform in terms of "a change in the role of the teacher from consumer of educational products to designer of instruction" (p. 50). Teaching, claim Edmonds and Pasch, must be conceptualized as "systematic instruction" (p. 51). The expertise of instructional developers in the universities must be combined with the subject-matter expertise of teachers to produce instructionally sound instructional products. Further, as advocated by other authors (Sinofsky and Knirk, 1981; Rosenberg, 1980; Bass and Duncan, 1981; Doughty and Durzo, 1981; Ullmer, 1969), faculty must themselves be trained in the instructional development process.

Beilby (1974) lends additional support to the concept of training faculty to assume instructional development responsibilities. Three approaches are discussed: teachers could work with instructional developers, teachers could acquire ID skills through inservice training programs, or "teacher preparation programs could contain ID philosophy and skills in the preservice curriculum" (p. 14). While the first approach will continue to be necessary, Beilby advocates more concentrated attention to training teachers in the instructional development process and to conducting more and better inservice ID programs for teachers currently in the field.

The considerable attention which has been devoted to the role of the instructional development process in increasing productivity and providing more accountability for learning can be viewed as a generic response to these demands. Forman (1980) addresses the issue of evaluation of training in business and industry, and its relationship to productivity and accountability. The evaluation of training, says Forman, "will have to be clearly linked to improving the program, documenting its effects, increasing its usefulness, or having some other demonstrable impact. Evaluation, in short, will have to be held more accountable for itself" (p. 50). The techniques for data gathering for evaluation will focus more on techniques which quickly and accurately measure actual job performance. Finally, such evaluation activities as "needs assessments, developmental testing, training program evaluation, and follow-up impact evaluation" (p. 50) will receive greater attention. The above author submits that the evaluation of a training program's impact upon actual job performance is and will continue to be "most important for the documentation of the effects and impact of training..." (p. 51). Such evaluation will, to a large extent, provide justification (or lack thereof) for future training expeditures. Unless it can be demonstrated that the training program had a favorable impact upon productivity, the future of that training program -- and possibly others -- will be in serious jeopardy.

Miller (1979) offers a simple formula, called "the training fraction" which "provides an indicator of the impact any training experience will have on a person's total experience" (p. 10). The training fraction is as follows:

$$\frac{\text{Hours Devoted to Training}}{(16) \times (365) \times (\text{age in years})}$$

The fraction implies that a training experience for any learner forms just a small part of that learner's accumulated experience, assuming 16 waking hours per day for 365 days a year, each year of the learner's life. For example, if the learner were 50 years old, the impact of a one-day (8 hour) training program could be represented as:

$$\frac{8}{(16) \times (365) \times (50)} = \frac{8}{292,000} = .000027$$

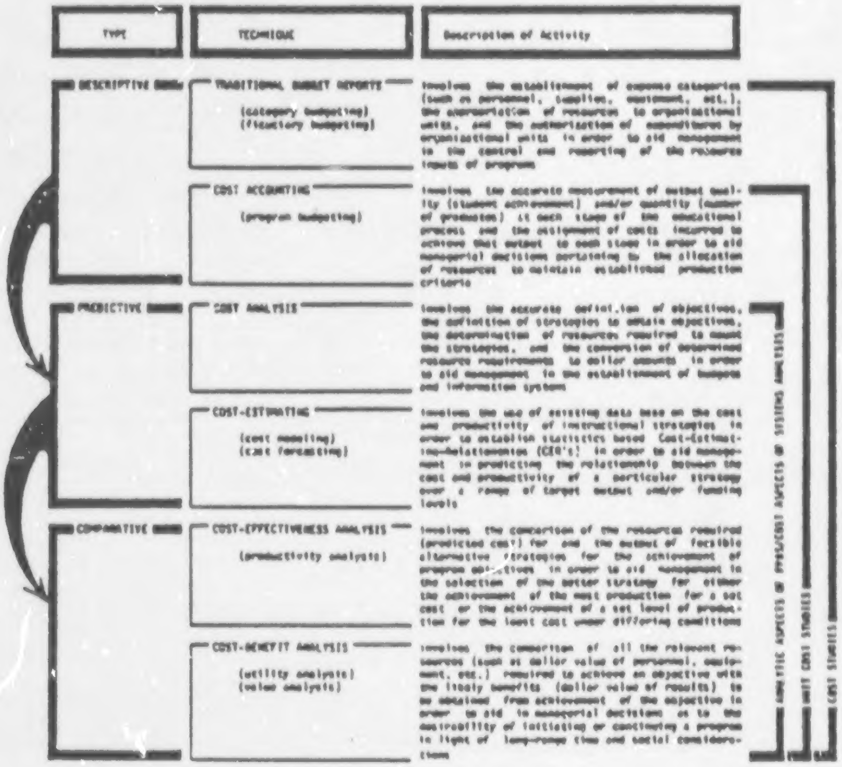
Thus, the 8-hour training program represents only .000027 of this learner's total life experience. Miller indicates that the training fraction implies three things. First, the chances are minimal that any single training event will produce a major behavioral change in a trainee. Second, it is imperative to build on the knowledge, skills and attitudes already possessed by the trainee. Finally, the training experience must be a highly compressed or highly charged experience; it must be so stimulating that it exerts an impact which overcomes its relatively brief time span" (p. 11).

Nadler (1980) supports the value of training -- especially in a difficult economic environment. "Training is designed to improve efficiency on the present job. During a tight economy, a manager wants all the efficiency possible, and training is one way to get it" (p. 174-175). The author, like Forman (1980), discusses at length the importance of useful evaluation techniques for educational and training programs and the value of using the results of program evaluation both as a means of providing an accounting of the learning that has taken place and as the basis for justifying future instructional expenditures.

Kemske (1980), in discussing the relative advantages and disadvantages of taking a "proactive" approach to training, discusses several measures which can be taken by training to contribute to the productivity of the organization. Basically, the instructional or training staff should remain flexible in its approaches to organizational needs, should increase its ability to anticipate organizational problems, should become more familiar with the industry in which the organization operates, and should become more knowledgeable of and responsive to organizational goals. These measures, if taken, are "ways in which training can contribute to 'the bottom line'" (p. 14).

The consideration of cost-effectiveness is more difficult to deal with in educational contexts. Indeed, Wilkinson (1978) declares that very little is known about the cost-effectiveness of instructional development. According to the author, the reasons for this lack of knowledge include the reluctance of academia to deal with cost-effectiveness questions; the pressure on administrators to produce immediate results, eliminating the long-range evaluation procedures necessary for demonstrating cost-effectiveness; the expense of gathering accurate cost information; and misconceptions of academia about the application of economic evaluation strategies and the underlying conceptual framework. Wilkinson offers a classification system for various costing techniques which can be used by the instructional developer. This classification system is presented in Table 4. Three broad categories of costing techniques are used, depending on the intent of the analysis: descriptive, predictive, or comparative (p. 174). Descriptive cost studies "seek to describe the costs of existing projects or programs" (p. 176). Predictive cost studies "seek to predict the costs of proposed systems" (p. 176). Comparative cost studies "seek to compare alternatives in a systematic manner" (p. 177). Wilkinson also stresses the importance of clearly stating instructional objectives in conducting any type of economic evaluation. The cost of evaluation must also consider such factors as the constraints within the instructional development project, alternatives to be evaluated in the cost evaluation report, and the "key cost factors that are included in the estimates" (p. 192). Detailed discussion of the techniques presented lead to the conclusion that the decision-maker (whether or not that person is the instructional developer) who utilizes such techniques can "arrange the trade-offs between cost and productivity in order to select among the alternatives" (p. 198). As such techniques become more simplified and better understood, they will become incor-

Table 4. CLASSIFICATION SYSTEM FOR COSTING TECHNIQUES



TYPE	TECHNIQUE	Description of Activity
DESCRIPTIVE	TRADITIONAL BUDGET REPORTS (category budgeting) (fiduciary budgeting)	involves the establishment of expense categories (such as personnel, supplies, equipment, etc.), the appropriation of resources to organizational units, and the authorization of expenditures by organizational units in order to aid management in the control and reporting of the resource inputs of programs
	COST ACCOUNTING (program budgeting)	involves the accurate measurement of output quality (student achievement) and/or quantity (number of graduates) at each stage of the educational process and the assignment of costs incurred to achieve that output to each stage in order to aid managerial decisions pertaining to the allocation of resources to maintain established production criteria
PREDICTIVE	COST ANALYSIS	involves the accurate definition of objectives, the definition of strategies to attain objectives, the determination of resources required to mount the strategies, and the conversion of determined resource requirements to dollar amounts in order to aid management in the establishment of budgets and information systems
	COST-ESTIMATING (cost modeling) (cost forecasting)	involves the use of existing data base on the cost and productivity of instructional strategies in order to establish statistics based Cost-Estimating-Relationships (CER's) in order to aid management in predicting the relationship between the cost and productivity of a particular strategy over a range of target output and/or funding levels
COMPARATIVE	COST-EFFECTIVENESS ANALYSIS (productivity analysis)	involves the comparison of the resources required (predicted cost) for and the output of feasible alternative strategies for the achievement of program objectives in order to aid management in the selection of the better strategy for either the achievement of the most production for a set cost or the achievement of a set level of production for the least cost under differing conditions
	COST-BENEFIT ANALYSIS (utility analysis) (value analysis)	involves the comparison of all the relevant resources (such as dollar value of personnel, equipment, etc.) required to achieve an objective with the likely benefits (dollar value of results) to be obtained from achievement of the objective in order to aid in managerial decisions as to the desirability of initiating or continuing a program in light of long-range time and social considerations

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SOURCE: G.L. Wilkinson. Economic evaluation in/of instructional development. In R.K. Bass and D.B. Lumsden (Eds.), _Instructional development: the state of the art_. San Diego, California: Collegiate Publishing, Inc., 1978, p.175.

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porated into the instructional development process.

Boutwell (1979), in a discussion of the need for flexibility and adaptability in the development of instructional systems, maintains that "systematic instruction is more cost-effective than traditional instruction and is therefore recommended during times of diminishing resources" (p. 31). Dick (1981) not only emphasizes the need to develop cost-effective instructional systems, but to concentrate greater effort on "improving the systems we already have" (p. 32). Further, Dick predicts that the role of technology in instructional development will be reassessed in order to determine the level of instructional technology which is appropriate in specified instructional situations, given the political, social and economic systems in which they exist.

The above authors present several means by which instructional developers can contribute to the productivity of the organization in which they work. As Dick (1981) points out, the optimal use of instructional technology is one significant means toward this end.

It is with this relationship between instructional development and technology that this present study concerns itself.

The Impact of Technology on Instructional Development

> The open society, the unresticted access to knowledge, the unplanned and uninhibited association of men for its furtherance - these are what may make a vast, complex, ever growing, ever changing, ever more specialized and expert technological world, nevertheless a world of human community.
>
> -- J. Robert Oppenheimer in Science and the Common Understanding, 1953.

Oppenheimer's words, spoken nearly thirty years ago, still embody both the hope and the fear with which we regard technology. The development of instruction in all environments has been both beneficiary and victim of the tremendous technological advances made in the past few decades. Our great hope is that these advances will serve us in our efforts to promote learning and the improvement of the human condition. Our great fear is that the pace of technological advancement may outrun us - that we may become the servants of our technologies and our ignorance.

Jay (1982) reinforces these ideas by asserting that:

> Everyone has a role in technological developments. We are either agents of change or instruments of manipulation....The system does not wait for us to catch up; it keep evolving, resulting in either a feeling of control for the educated or feelings of manipulation for the ignorant. We develop as either agents or instruments in technology. There are no innocent bystanders (p. 22).

Today's instructional developer would, indeed, be well advised to keep abreast of current instructional technologies. Jay's (1982) assessment carries a valuable lesson for those instructional developers who wish to remain part of a profession. In order to be effective instructional development professionals, we must also be effective and continuous learners. Otherwise, technology -- and our profession-- will leave us behind.

The instructional development literature has been replete with an assortment of works devoted to various aspects of technology and its applications to instruction. Some authors express their personal philosophies regarding the state of instructional technology and its present and future impact on the instructional development process. Other authors concentrate on particular technologies, such as the microcomputer, and expound on their applications in a variety of instructional environments. Although it is beyond the scope of this current study to provide a detailed account of this literature, it is nevertheless essential to provide a brief discussion of some of the current works.

A search of the literature of instructional technology reveals that one technological theme is dominant -- that of the application of computers in various phases (perhaps all phases) of the instructional development process. Johnson (1981) speaks of a "new technology" consisting of three key elements: "microelectronics, communications, and information science" (p. 15). Computers, claims the author, are at the very center of this new technology. Current uses of microelectronic circuits extend into our homes (e.g. televisions, automobiles, microwave ovens) as well as into education. The phenomenal rate of progress in the computer industry is illustrated by the following:

> A recent advertisement for a computer publication explained that if during the last 30 years the automobile industry had made the same progress as the computer industry, a Rolls Royce would cost $2.50 and get 2,000,000 miles per gallon. It did not state that the car would be too small to fit into. (p. 17 from Advertisement; Computerworld, May 21, 1979)

Basically, explains Johnson, computers are becoming less expensive, smaller, and less comsumptive of energy. Computing costs are expected to continue to fall at the rate of approximately 30 percent per year over the next decade (p. 17). Combinations of various technologies are being similarly refined and applied. Voice synthesizers, capable of scanning a printed page and "reading" the material in a simulated human voice are now available. The videodisc, capable of storing 54,000 separate frames of information, can be used either alone or interactively with a computer. However, in spite of rapid growth in technology, its application to education has not kept pace with that in other areas, such as business, engineering, defense, and medicine. The above author cites several reasons for this gap. First, instructional design methodologies as applied to computer-based instruction have been lacking. Second, in academia, the cost per student of incorporating computer-based instruction, while it has been declining, is still prohibitively high for most educational institutions. Third, due to lack of computer expertise in most educational institutions, the computer is most often either underutilized or expected to perform functions more appropriate for more sophisticated (and expensive) units. Fourth, the interactive capabilities of the computer have not been fully brought into play. Instead, they are most often used for the teaching of simple facts. Finally, there has been great resistance among faculty to the changes in "comfortable, accepted practice" brought about by the introduction of new instructional technologies (p. 19).

Gagné (1982) agrees with Johnson's (1981) contention that instructional designers and the producers of instructional computer programs need to combine their efforts to improve the quality of these programs as far as their "use of instructional design principles is concerned" (Gagné, 1982, p. 15).

As is true when any innovation is introduced, the advent of computer technology in education met with various types of resistance. Computers were compared with the teaching machines of the 1950's and were rejected as "toys, unusable in classroom situations" (Diem, 1982, p. 19). Teachers and administrators resisted them out of ignorance and out of fear for how computers might impact such issues as job security and the role of the teacher. Diem discusses three major issues that must be addressed if education is to accept the computer and utilize it to its full potential. First, educators must attain knowledge of computer terminology, the mechanical operation of computers, software selection, and basic computer programming. Second, educators must learn how to apply computer technology in educational settings. The computer is a powerful tool which should not be underutilized, but it will never solve all educational problems. Finally, both educators and students need to learn about the impact of computer technology on society and on their personal lives (pp. 20-21).

The computer, in addition to its use as an instructional tool, has another major application in instructional settings -- its use as a tool for administrative information storage and retrieval. Barrett and Hannafin (1982) discuss such a use for the computer and point out its value in managing an educational system. In a previous section of this present study, the issue of accountability was discussed. The authors mentioned in this regard how the computer can be used to assist educational management in providing detailed and current data to satisfy the demand for accountability. Barrett and Hannafin also discuss how the computer can help with regard to a number of dimensions of the accountability issue. These dimensions include:

curriculum continuity, content systemization, individualization of instruction, satisfaction of community and national pressure groups, coping with staff turnover in maintaining curricular consistency, the effective local management of instruction, data-based evaluation and modification of instruction, and selection of instructional materials based upon "empirically determined instructional needs" (pp. 9-10).

Clearly, instructional development professionals in all environments must be keenly aware of the current and future applications of computer technology to the instructional development process. Kurshan (1981), focusing on the widespread use of the microcomputer, points out that,

> Control of microcomputer technology within the instructional development community will depend upon how well instructional developers understand and facilitate the use of computers for instructional purposes. Understanding of this sort is possible only if both computer technologists and instructional developers actively and cooperatively attempt to maximize the instructional potential of microcomputers (p. 28).

Kurshan (1981), like Diem (1982), specifies certain issues with which instructional development professionals must deal , such as the selection of appropriate computer hardware, the attainment of "computer literacy," and the familiarization with available software (e.g., instructional programs) and its place in existing or proposed curricula (Kurshan, 1981, pp. 28-29).

A brief buf informative review of the possible uses of the computer in education is provided by Roecks (1981). His list of thirteen uses of the computer in education is provided in Table 5.

While the instructional development literature has tended to focus primarily on application of computer technology to instruction, the more established instructional media have their place in any discussion of the relationship between technology and instructional development. Certainly, these other media, whether used alone or in combination with the computer (e.g., videodiscs and microcomputers), have themselves progressed. Wright (1981), for example, submits that, "The capabilities of today's video technology and the possibilities of tomorrow's are staggering" (p. 40). Wright foresees the substitution of small electronic chips, or cards, for the current video tapes and even for videodiscs. None of the capabilities presently available in video technology will be sacrificed for the sake of miniturization. In fact, present capabilities will be expanded and refined to provide more speed, flexibility and portability. Video cameras will also continue to become smaller, lighter and less expensive. Already, videocassette recorders are built into some cameras. The ability to access large data banks through

Table 5. THIRTEEN USES OF THE COMPUTER IN EDUCATION

1. Administrative
    - * Accounting, payroll, and employee records
    - * Attendance, grades, and student records
    - * Timetabling, planning systems
2. Curricular Planning
    - * Resource information file
    - * Production of instructional materials
3. Professional Development
4. Library
5. Research
6. Guidance and Special Services
    - * Vocational counseling
    - * Diagnosis and remediation
7. Testing
    - * Test construction
    - * Test scoring
    - * Test evaluation and analysis
8. Instructional Aid
9. Instructional Management
10. Computer-Assisted Learning
11. Computer Awareness and Literacy
12. Computer Science
13. Institutional Coordination
    - * Information sharing
    - * Coordination of existing computer services

Note: The first twelve uses were suggested by Norman Watts in the April, 1981 issue of Educational Technology.

SOURCE: A.L. Roecks, How many ways can the computer be used in education? A baker's dozen. Educational Technology. September 1981, p.16.

combined use of a microcomputer and a video monitor opens a multitude of possibilities for home, business and educational uses. Trips to a library, for example, may be rendered obsolete. The information needed (including graphics) may be displayed on a video screen or even printed out. The student need never leave his/her desk at school, or possibly, the family room at home. Wright also predicts that a vast array of technological products and services will be made available in the next decade through the combination of video and computer technology alone. The above author submits that, "It is somewhat frightening to think that video and computer technology can give us almost anything we ask for. We must prepare ourselves for the electronic scramble of the next ten years" (p. 40).

DeChenne and Moore (1982) suggest that instructional developers investigate the existing, more traditional media now in use to determine how they might be more effectively and efficiently utilized. While the newer media and technologies are certainly rapidly developing into effective instructional tools, the older alternatives may be more easily and immediately implemented. They may also provide more cost-effective choices in times of economic uncertainty and tight budgets.

Ragan (1982) takes this concept a step further in a humorous but intriguing analysis of "the oldest medium"

(p. 29), with the following justification:

> We do possess attributes, just as other media do, and to ferret out and describe those which seem relevant and important to instruction can be a source of both renewed respect for our own uniqueness as instructional agents and new appreciation for the significance and place of our tools. Such is not an entirely simple task. Yet, as Aristotle said, "know thyself." (p. 29)

Ragan's description of the human body as an instructional medium is provided in Table 6.

Heinich (1982), in a presentation to the Instructional Communication Association of the State University of New York at Buffalo, submits that new instructional technologies necessitate consideration of system-wide change. For example, "as technology becomes more pervasive and sophisticated in a culture, it is dealt with on higher policy levels and requires more comprehensive planning processes." The impact of technology on any social system, therefore, must be analyzed in terms of the system-wide impact, not simply in terms of the impact on the particular subsystem which is most immediately and directly affected. Heinich further suggests that instructional development professionals need to study how other areas (e.g., engineering) have reacted to technology. There are valuable lessons to be learned, lessons which may help us to understand and properly utilize the instructional technologies of today - and those of the future.

The above discussion of the impact of technology on

Table 6. THE HUMAN BODY AS AN INSTRUCTIONAL MEDIUM

1. Visual display in full color, 3-D and motion. Resolution and detail of the display limited only by distance and the visual acuity of the learner. Potentially, an attractive, compelling display.

2. Self-programming. Learns content and devises and carries out instructional strategies without necessary intervention or assistance from instructional designers.

3. Can provide immediate or delayed feedback. Both verbal and non-verbal feedback are accessible through speech, written communication, body language (movement, expressions), and other forms of display.

4. Learner controlled. Can be interrupted and asked to provide help, examples, review, and other instructional events at learner request, and is capable of responding to a wide range of learner control options without formal programming.

5. Configurational and constitutional similarity. The general configuration of the instructional delivery agency is very similar to that of the students; it is, in fact, "one of them," facilitating mutual understanding through the same or similar information-processing systems and other shared conditions.

6. Extremely large long-term memory. For all practical purposes, long term memory is infinite.

7. Limited short term memory. Unless special visual mediation or mnemonic bypass techniques are employed, short term memory for non-meaningful information is limited to approximately seven plus or minus two bits.

8. Slow processing speed. Numerical data processing and other tasks requiring extensive iteration of multiple operations are performed very slowly when required to function without assistance from adjunct devices such as calculators or computers.

9. Unreliable. Cannot be repeated well. Demands of repeated identical performance typically degrade both specific and overall performance over time.

10. Makes high demands on environment. Whether performing instructional duties or not, consumes expensive organic material as fuel and burns approximately 1,200 calories per day.

11. Self-storing and portable. Needs no electrical wiring and is excellent for field use.

12. Expensive. Cannot be purchased outright; available only on lease plans (called "salary") at from $10,000 to $50,000 (approximately) per year at present rates.

SOURCE: T.J. Ragan. The oldest medium. Educational Technology. May 1982, p.29.

instructional development can be concluded by citing two somewhat different views on the value of technology in the instructional development process.

Johnson (1981) asserts that, "If the new technology does nothing more than cause a serious discussion of the goals of education, it will have served a worthwhile purpose" (p. 23).

Bass, Lumsden and Dills (1978), taking a somewhat more demanding position, maintain that, "Unless the actual practice of instruction is significantly effected by what we do, all our improved technology is virtually worthless" (p. 237).

Clearly, our expectations for the future demand, to a large degree, on our perceptions of the present.

In discussing the future of instructional development thus far, this study has considered three issues which are likely to become increasingly important to the ID profession: unification of the instructional development profession, the demands of productivity and accountability, and the impact of technology on instructional development. This present study now directs itself toward three other vital issues for the future of instructional development: the need to obtain organizational support for the ID process, the necessity for continuing education of instructional development professionals, and the role of the ID professional as organizational change agent.

Getting the Needed Organizational Support for Instructional Development

Instructional development efforts, conducted in any environment, are efforts geared toward the introduction of innovation and change into the system. As in the introduction of any organizational change of considerable scope, instructional development projects must rely to some degree upon organizational support in order to succeed. As Schlesinger and Sikes (1970) testify, "The establishment of appropriate linkages to power is crucial to successful organizational change efforts" (p. 5).

In discussing needed organizational support for instructional development, two types of support must be considered: formal support, which is usually documented and often detailed in the form of a contract or proposal; and informal support, which is almost never documented and is usually established through interpersonal contacts leading to mutual understanding of the goals, responsibilities and kinds of support to be expected by both the client and the instructional developer (or ID team). Additionally, organizational support (both formal and informal) must come from two groups in the organization:

the formal decision-makers in the organization (top administrators in education, top management in business) and the "contact personnel" (author's term) in the organization (faculty and/or students in education, line management and/or trainees in business). Finally, instructional developers obtain organizational support basically in two ways: either support is granted or it is earned. Initially, an attempt to conduct an ID intervention in an organization may be granted due to a willingness of the organization to experiment based on a perceived or actual organizational need, or simply because instructional development efforts in similar organizations have been found to be successful. However, decisions on whether or not to continue support for ID interventions are made based on performance -- whether or not those instructional development efforts have had a favorable impact upon the organization. If the impact has been favorable (and, usually, demonstrable), support has been "earned" and will likely continue. However, if there has been little or no favorable impact (or a negative impact), organizational support for future instructional development efforts could be very difficult to obtain; it may even cease entirely.

Bratton (1978) reports that personal contact between instructional developers and the administration and faculty in institutions of higher education is one of the most effective strategies for eliciting support. Two other effective strategies are "projecting a service orientation" and "providing incentives and rewards for faculty engaging in instructional development" (p. 146). Certainly, these strategies are also effective in a business setting. The personal contact between instructional developer and client is often the determining factor in the relationship. Rapport often takes precedence over expertise or even final results. Projecting a service orientation is critical, especially when the organization is unfamiliar with the capabilities of a conscientiously and systematically conducted ID intervention. The previously discussed controversy among instructional development professionals concerning the "shotgun" approach versus the "concentrated" approach (Braden and Terrell, 1978) is an appropriate consideration in determining how best to project a service orientation. As was indicated in a previous section of this present study, the answer is relevant depending upon the particular set of circumstances involved. In business, providing incentives and rewards for ID clients is perhaps more easily dealt with. As was previously indicated (Wallington, 1980), the incentive in training is the impact of that training on job performance. Improved job performance is, in turn, rewarded.

In terms of financial support for instructional development, Bratton (1978) reports that most of the funds provided to ID centers in higher education come from the institutions themselves (p. 146). Naturally, in business settings, the organization is most often the sole provider of financial support, since it is most often the sole beneficiary of the ID intervention.

Finally, if instructional developers are to continue to earn the support of their organizations, they must, as Bratton says, establish "a respected performance record" which meets the needs of faculty and students by "creating a non-threatening climate in which the faculty are able to experiment with innovative instructional techniques" (p. 149). In training circles, earning continuing organizational support is discussed in terms of establishing and maintaining credibility. Dobbs (1980) offers some very pragmatic advice to ID professionals in training departments for building credibility in the organization (pp. 16-21). First, the current level of credibility of the training department should be assessed by surveying both the training staff and key line managers (clients). Second, key line managers must be involved in the training process by using them as instructors, coaches, reinforcers and positive role models. Also, managers should be kept informed of the training given to their subordinates. Third, managers must be involved in the evaluation of training results, since they have such a large investment in those results. Finally, Dobbs maintains that the management of the training function must keep pace with advancements in instructional technology.

Training professionals themselves, when asked to indicate the most important "behavioral requirements" for success, attributed the most importance to credibility (Pinto and Walker, 1978).

Instructional development cannot survive in any environment without the continual support of the organization or institution concerned. Although that support is vital, it is often difficult to elicit and to maintain. However, instructional development professionals, aware of the necessity and challenges involved, will have to continue to develop and refine strategies for obtaining that support.

The present study now concerns itself with another vital issue for the future of instructional development - the continuing education of instructional development professionals.

The Continuing Education of Instructional Development Professionals

An earlier section of this present study (Current Trends in Instructional Development) discussed some of the attempts which have been made in attempting to define and develop needed competencies for the instructional developer (AECT, DID, 1980; AECT, DID, 1981; Silber, 1981) as well as other works which provided recommendations for the training of instructional developers (Bass and Duncan, 1981; Bratton, 1981; Bunch and Crook, 1981; Doughty and Durzo, 1981; Faris, 1981; Gorr, 1979; Leitzman et al., 1979; Rosenberg, 1980; Wallington, 1981; Walter and Earle, 1981). These authors indicate that, while much progress has been made in defining the role of the instructional developer, the needed competencies, and the types of training required to prepare the instructional developer to attain those competencies; much remains to be done. Indeed, the continuing education of active instructional developers is likely to take on increasing importance in the coming decade.

Spitzer (1979) severely criticizes continuing professional education programs in general. In spite of the growing demand for continuing education (CE) in many professions (e.g., health care, business management, teaching), the quality of such programs is often questionnable Spitzer's criticism focuses on what he considers to be twelve "major characteristics of continuing professional education" (p. 26). These are as follows:

1. Continuing professional education is oriented toward one-shot workshops and seminars.
2. Continuing professional education begins with a solution, rather than a problem.
3. Continuing professional education programs are generally short-term interventions.
4. Continuing education programs generally focus on information learning rather than skill learning.
5. Continuing professional education activities are generally sold as a product to educationally unsophisticated consumers.
6. Entrepreneurship and the profit-motive tend to dominate continuing professional education.
7. Demand for continuing professional education currently exceeds supply.
8. There are virtually no objective standards for continuing education.
9. Participants in programs are generally rewarded for attendance rather than performance.
10. Continuing professional education tends to be based primarily on adult education assumptions rather than on principles of effective instructional design.
11. There is a lack of agreement as to the goals and objectives of continuing professional education.
12. Virtually no mechanisms for evaluating the effectiveness of continuing education currently exist. (pp. 26-28)

Even though Spitzer speaks of such characteristics applying to continuing education in many professions, the situation applies to many such programs targeted toward the instructional development professional - especially in the training area. There exists a multitude of advertisements marketing a miscellany of seminars, workshops, textbooks, instructional media, manuals and other offerings for the practicing teacher, media specialist, corporate trainer, training manager, consultant, and instructional developer. The packaging is most often attractive and the price almost certainly exorbitant. The instructional quality is often mediocre, sometimes horrendous; it is very seldom superior. Spitzer sees great opportunity for improvement of continuing education programs and envisions the instructional developer playing a significant role in that improvement. It is, perhaps, ironic (yet, appropriate) that the major burden of planning, implementing and evaluating efforts toward the improvement of the continuing education of instructional development professionals (and other professionals) will be on instructional developers themselves.

Instructional development professionals are likely to engage in continuing professional education for several reasons. First, such continuing education may someday be needed for certification. Second, the entry-level criteria for newly hired instructional designers and developers in some organizations specify certain formal educational prerequisites in such areas as instructional design, learning theory, research methodology, educational psychology and evaluation. Knowledgeable business organizations and educational institutions tend to demand the most highly qualified ID personnel in times of financial uncertainly, knowing that the added investment will be extremely cost-effective in terms of more effective training for their personnel, resulting in increased productivity.

Finally, instructional developers (like other true professionals) seek to constantly update their own professional skills and knowledge. The field of instructional development is progressing very rapidly. Even a brief examination of the basic competencies needed by the instructional developer (AECT, DID, 1981) suggests the scope of expertise needed by the ID professional.. The instructional developer must continue to learn or face the probability that his/her knowledge and skills will soon be obsolete. Zemke (1981) provides further evidence of the critical importance of continuing education by pointing out that adults engaged in such programs (or in self-directed learning) do so because of "the desire to retain, obtain, advance and/or perform better in a job or career" (p. 10). Further, the author reports that those engaged in either "professional or technical work are most likely to engage in learning" (p.14).

Colton (1978) shares some of his strategies in the teaching of graduate level courses in instructional design and development. Basically, the author advocates a more experiential approach to teaching the instructional development process, an approach he terms the "process-product" approach (p. 39). For every step in the ID process, students are required (either indiviudally or in collaboration with other students) to produce a product. For example, in addition to being taught about the writing of instructional objectives, students actually write objectives for a specific instructional project. Students are guided through the other steps of the ID process in a similar manner, developing their "final" instructional project (product) as the course progresses. Other authors (Bass and Duncan, 1981) also stress the need for allowing students to practice instructional development techniques as they learn ID concepts. Clearly, in the training of instructional developers such a pragmatic approach is needed in order to produce competent practitioners.

Finally, Clark (1978) expresses concern for the quality of research conducted since the late 1960's about instructional development - and by instructional developers. Clark also submits that more attention should be devoted to research in doctoral programs in instructional development, and asks, "Why have we apparently given up the academic ideal of scholarly inquiry as the defining characteristic of graduate education at the doctoral level?" (p. 167). Clark offers several suggestions for upgrading the quality of research training in doctoral instructional development programs. First, the faculty in these programs should attempt to improve their own knowledge of statistics and research design. There have been significant advances in these areas in the last few years, and it is too easy for already overburdened faculty to fall out of step (p. 169).

Second, curricula in these programs should be re-examined to ensure that they prepare instructional developers who are both "practitioners" and "researchers" (p. 170). Third, doctoral students should be actively involved as faculty research assistants. After experience is obtained in the entire research process, students could begin to work independently on their own research projects. Finally, Clark suggests that the "soft money acquired by contracts serve research training, and not vica versa" (p. 172). Institutions which have strong research programs will be more likely to attract higher quality graduate students, will be more likely to attract future funding, and will be more likely to prepare instructional developers who are competent in conducting much needed research in the instructional development profession.

This present study now focuses on one final, important issue in the future of instructional development -- the instructional developer's role as organizational change agent.

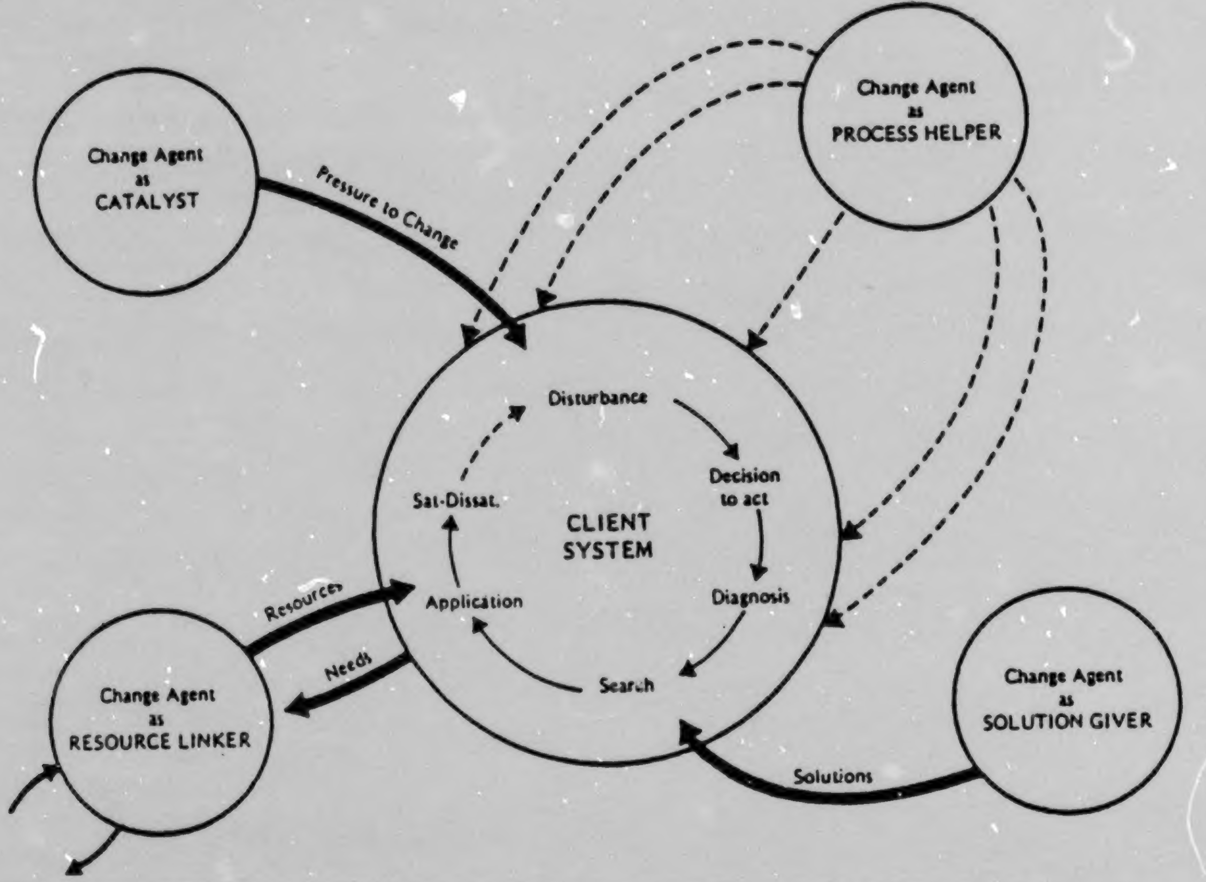
The Instructional Development Professional as Organizational Change Agent

A previous section of this chapter, in discussing the demand for higher productivity as a current trend in instructional development, compared various authors' views regarding the best approach to ID in terms of having a favorable impact upon the learning process in an organization (Braden and

Terrell, 1978; Diamond, 1971; Heinich, 1971). Regardless of the approach taken, the implementation of an instructional development project is viewed by the client system (organization, institution, or individual) as a change from the status quo. Often, the change represents a new experience to the client system - an innovation. It is useful, therefore, to look at the role of the instructional developer as change agent.

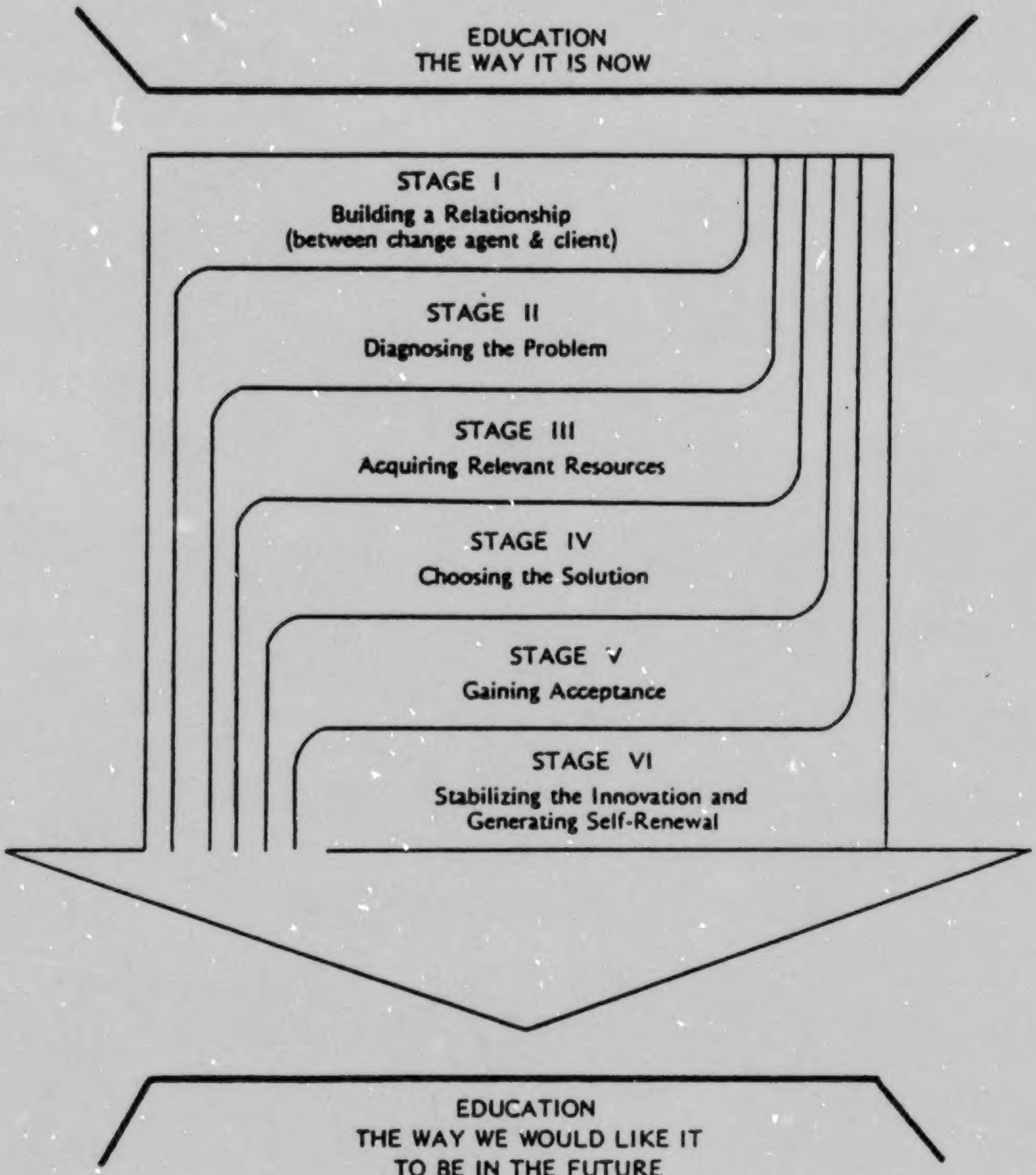
Havelock (1973) suggests that a change agent is, simply: "a person who facilitates planned change or planned innovation" (p. 5). He also submits that there are four ways in which a person can act as a change agent: a catalyst, a solution giver, a resource linker, or a process helper (p. 7). These four ways to be a change agent are shown in Figure 6. A change agent may act as a catalyst by putting some type of pressure on the client system to change. A change agent may simply prescribe solutions to problems in the client system. The change agent may also act as a liaison between the client system and resources needed to help the client system solve its problems. Finally, in the role focused upon by Havelock, the change agent may act as a process helper, guiding the client system through the change process and leaving the client system able to function with the change by itself. Havelock offers a six-stage model for describing the change agent as a process helper. This model is illustrated in Figure 7.

Figure 6. FOUR WAYS TO BE A CHANGE AGENT



SOURCE: R.G. Havelock, The change agent's guide to innovation in education. Englewood Cliffs, New Jersey: Educational Technology Publications, 1973, p.8.

Figure 7. CHANGE AGENT AS PROCESS HELPER



SOURCE: R.G. Havelock, The change agent's guide to innovation in education. Englewood Cliffs, New Jersey: Educational Technology Publications, 1973, p.11.

A brief description of each stage of the model is as follows:

Stage I:	BUILDING A RELATIONSHIP	The first thing the successful change agent needs to develop is a viable relationship with the client system or a solid base within it. A secure and reasonably well-delineated helping role is an essential place from which to start.
Stage II:	DIAGNOSING THE PROBLEM	Once established in the client system, the change agent must turn to the problem at hand. He must find out if the client is aware of his own needs and if the client has been able to articulate his needs as problem statements.
Stage III:	ACQUIRING RELEVANT RESOURCES	With a well-defined problem, the client system needs to be able to identify and obtain resources relevent to solutions.
Stage IV:	CHOOSING THE SOLUTION	With a defined problem and a lot of relevant information, the client needs to be able to derive implications, generate a range of alternatives, and settle upon a potential solution. Even a good solution needs adaptation and needs to be reshaped to fit the special characteristics of the client.
Stage V.	GAINING ACCEPTANCE	After a solution has been developed and adopted, it needs to be moved toward acceptance and adoption by the widest possible number in the client system. By describing, discussing, and demonstrating, the

Stage V.	GAINING ACCEPTANCE (con't)	change team helps the client to gain awareness, develop interest, evaluate, try out, and finally adopt the innovation. In doing so they rely on many channels and make maximum use of natural leadership and informal communication.
Stage VI:	STABILIZATION OF THE INNOVATION AND GENERATING SELF-RENEWAL	Finally, the client needs to develop an internal capability to maintain the innovation and to continue appropriate use without outside help. The change agent encourages members of the client system to be their own change agents and to begin to work on other problems in a similar way. As this self-renewal capacity begins to build, it allows the gradual termination of the relationship so that the change agent can move on to other projects, other problems, and other clients. (pp. 13-15)

Lewin (1947) introduced the concept of the change process as consisting of three phases: First, there is an "unfreezing" of the status quo. Existing constraints relevant to the change must be loosened so that the system's resistance to the change is reduced. Second, there is a "changing," whereby the change is introduced or implemented. Finally, after the change has become adopted, there is a period of "refreezing" whereby the new status quo incorporates the new change, thereby protecting it as a part of the system. In analyzing the resistance of a system to change, Lewin (1951) offers the technique knows as Force Field Analysis, which is a means of analyzing both the driving forces which exist in a system (those forces which tend to initiate and facilitate change), and the restraining forces in a system (those forces which act to hold back or decrease the driving forces). Such a technique is very useful in diagnosing the conditions which exist prior to a change effort, in helping to determine possible courses of action in bringing about change, and in providing an estimate of the amount of resistance which is likely to be encountered in implementing the change - and the possible sources of that resistance. Such information is valuable to the change agent in making decisions concerning whether or not to introduce the change, whether or not to reduce (or increase) the magnitude of change, where to target the most concentrated efforts to gain support, and other matters.

The importance of carefully diagnosing the problem which exists in the organization (system) prior to making a change effort is emphasized by Lorsch and Lawrence (1965). The diagnosis of the organizational problem necessitates asking two major questions. First, what data must be gathered? Second, how will the data be interpreted and fed back to members of the organization? Surveys and personal interviews are the most widely used techniques for gathering data. However, these techniques must be utilized carefully and systematically; otherwise, the reliability of the data and the credibility of the investigator could legitimately be called into question. The techniques of gathering organizational data are more thoroughly discussed elsewhere (Farace, Monge, and Russell, 1977; Goldhaber, Dennis, Richetto, and Wiio, 1979; Logue and Freshley, 1977; Katz and Kahn, 1978; Rogers and Rogers, 1976). In the process of gathering data and diagnosing the organizational problem, the change agent (investigator) must also be careful not to raise expectations in the organization which cannot be met (Lorsch and Lawrence, 1965).

A change agent must possess certain skills, knowledge and attitudes in order to be successful in facilitating the change process in an organization. While some effort has been made to describe the competencies needed by the change agent (Havelock, 1973), a particularly helpful self-administered checklist is provided by Harris (1981). This checklist, shown in Table 7, describes some of the characteristics of effective change agents. The checklist (or inventory) is divided into two parts. Part one asks respondents to rate themselves on their personal style regarding: openness, flexibility, sensitiveness, creativeness, person-centered orientation, goal-oriented planning, group understanding, and communicativeness. Part two provides an indication of the respondent's ability to effectively cope with rapid personal and organizational change.

Instructional developers take on the roles of change agents whenever they attempt any instructional intervention. The dissemination of the instructional development process itself is a major effort toward system (organizational) change. One of the most important goals of the instructional developer as a change agent is the promotion, application and improvement of the instructional development process. It is essential that the instructional developer be able to effectively communicate the benefits to be derived from application of the ID process (Duncan, 1978).

In university settings it is possible for the instructional developer to initiate change through dissemination and application of the ID process by training faculty to become instructional development change agents

Table 7. CHANGE INVENTORY FOR LEADERS

Do you have a positive or negative attitude toward change? Most people fear change, but the issue is whether you let such concern paralyze you into inaction. Some persons merely react to change; others are proactive — they plan and control change.

PART I

The following checklist includes some characteristics of effective change agents. Perhaps you will be aided if you analyze yourself as an agent of change in an organization or community. Evaluate yourself on these criteria; check present life style in terms of one of the following: "usually," "sometimes" or "never."

	Usually	Sometimes	Never
1. **Openness** — willing to consider new ideas and people of differing opinions; tentative in communications, rather than dogmatic or closed-minded in one's approach.			
2. **Flexibility** — adaptable to new people, situations, information and developments; able to handle the unexpected and to shift position; spontaneous in responding to the "here and now" data and experiences.			
3. **Sensitiveness** — conscious of what is happening to oneself and others in the communications about the change and its effects; aware of the needs and feelings of others because of the proposed change; able to respond empathetically.			
4. **Creativeness** — respond with resourcefulness to new people and situations; avoid stereotype answers and solutions; exercise initiative, imagination and innovativeness.			
5. **Person-centered** — concerned more about people than task or mere progress; care what happens to people involved in the change; support, encourage, inform and involve people in decisions for change they will be expected to implement; respect right of dissent.			
6. **Goal-oriented planning** — develop a case for change with others which takes into account long-range objectives, while developing a plan with different stages or targets and short-term steps to accomplish planned change; communicate these purposes and plans to all involved; state goals in terms that have positive value to those affected.			
7. **Group understanding** — possess knowledge of the group process and skills in group dynamics; analyze the driving and resisting forces within the group relative to the proposed change; understand the character, structure, needs and wants of the group or organization to be affected by the change; involve entire group in change process.			
8. **Communicativeness** — promote open, circular interaction; able to analyze and clarify the problem and reasons for change; motivate members to desire to change and to use the available resources; develop a helping relationship with others so they can accept and live with the change.			

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Table 7. (continued)

PART II

Relative to your capacity to cope more effectively with rapid change in your personal and organizational life, indicate your present typical response by checking the category in the right-hand columns which is most appropriate for each descriptive item in the paragraphs on the left. Be self-critical, for no one will receive these results but you, and it is intended as an exercise in "mind-stretching."

	Usually	Sometimes	Never
9. Changing image — possess the capacity to re-evaluate concept of self based on new feedback, so as to expand my self-image; fluid in my self-conception, amplifying my sense of identity as a result of new encounters and experiences.	________	________	________
10. Changing construct — willing to review periodically the way I read meaning in my life; flexible in my attitudes and perceptions, so as to make "new sense" out of added inputs and insights; able to break out of "old mindsets" and to develop new rationale; able to accept, at times, inconsistencies and discontinuity in my life.	________	________	________
11. Changing values — able to sense new needs in myself and others, to develop new and changing life values, to abandon past, ready-made values and ideals, to revise expectations of self and others; and as a result, willing to re-examine norms or standards which I have set for myself and others and to develop new ones as appropriate.	________	________	________
12. Changing role — willing to have an unclear, hazy role in life or an organization — one that is dynamic and responds to current relevant needs; able to live with a role definition which is open-ended and subject to continuous clarification; accept new role definitions for women, parents and spouses, colleagues, professionals and other career people.	________	________	________
13. Changing society — able to be comfortable with impermanence or a lack of structure; capable of coping with constant alteration and perpetual transition; willing to live in changing times, without the traditional stability and reference groups; able to make the most of the present moment — the "here and now" — [illegible] be "existential" or to "hang loose;" ready to combat unwarranted resistance to change in myself and the communities in which I participate.	________	________	________
14. Changing goals — concerned about actualizing my own and others' potential, as well as increasing the levels of awareness and consciousness in both; seek improvement in my capacity for feeling, and intuitiveness, for creating and risk-taking; desire more knowledge and education for personal and professional development; willing to provide cultural leadership by experimenting with new life styles of adaptation to the demands of rapid change.	________	________	________
15. Changing life style — willing to be more transient and mobile within and among organizations; able to change jobs and locations when appropriate; capable of abandoning old relationships when necessary, and to search for new, more meaningful ones; willing to reject past stereotypes of other people, especially various minorities or foreigners; able to participate in team efforts to solve increasingly complex problems; able to cope with stress and urban crowding, lack of privacy, noise, pollution and other modern discomforts, while seeking to improve these situations; capable of enduring discontinuities and disconnections in my life.	________	________	________

Note: These inventory items are offered with a view to stimulating your thinking about planned changes within your personal and organizational life space if "future shock" is to be avoided or minimized. There are no "right" or "wrong" answers. Research indicates that people who check "usually" are moving in the direction of developing those qualities which make for a more healthy personality in today's and tomorrow's fast-changing world. Those who check only "sometimes" or "never" are challenged by such items to set new personal goals which enable them to move in the future to a state of mind or behavior whereby they can mark "usually" if they were to retake the inventory.

SOURCE: P.R. Harris, Synergistic training and education. Training and Development Journal. May 1981, p. 58.

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themselves. A previous section of this present study discussed such a project at Oregon State University. The fund for the Improvement of Post-Secondary Education (FIPSE) Project on Professional Development, initiated in 1978, has proven successful in the use of selected teams of faculty who are trained in the ID process to train larger numbers of faculty in the instructional development process. This approach offers one technique for the efficient utilization of instructional developers in initiating and facilitating innovative interventions in higher education (Osterman, 1979).

The instructional developer must be able to accurately determine the readiness of the system for the innovation (or change) to be introduced. The innovation must have advantages that make the required effort worthwhile. Innovations which are somewhat compatible with existing practices in the system have a better chance of being accepted, as do those innovations which are relatively uncomplicated and easily understood by those to be affected. Innovations which are amenable to implementation on a trial basis will meet less resistance. Finally, those innovations which demonstrably improve existing practice are more likely to be accepted (Abedor and Sachs, 1978).

If the innovation is introduced before the system is ready to accept it, three possible outcomes could be predicted:

1. The innovation would be modified (made less innovative) so as to fit the existing level of readiness; or
2. The innovation might be adopted but not integrated with existing practice, therefore, having little long-term effect; or
3. The innovation would not be adopted in any form. (Abedor and Sachs, 1978, p. 7).

Once an innovation is adopted and proven successful, the readiness of the system for innovation is likely to increase. As the system successfully adopts "several.... less radical innovations, overall readiness could be increased" (Abedor and Sachs, 1978, p. 13). This would seem to argue for the so-called "shotgun" approach to instructional development (Braden and Terrell, 1978). However, the instructional developer must follow the advice of other authors (Havelock, 1973; Lorsch and Lawrence, 1965) and carefully diagnose the problems to be solved before choosing any particular approach to solving those problems - instructional "problems" included.

It is apparent that the instructional developer must, indeed, be an agent of instructional change and innovation. Lawrason (1978) further points out the necessity for the instructional developer, as a change agent, to "be willing to identify, utilize and attempt to modify the institution's political power structure in order to develop policies that lead to meaningful improvements of instructional programs" (p. 153). Instructional developers need to be skilled in a wide range of competencies in order to be successful agents of instructional change and innovation. Lawrason (1978) maintains that the three most important competency areas in this regard are "instructional systems, interpersonal communication systems, and... organizational systems" (p. 169). More detailed study related to the instructional developer as change agent would contribute measurably toward present efforts being conducted in determining the needed competencies of the instructional developer. Such study would also, since it would vividly point out some of the major tasks required of all instructional development professionals, contribute to the badly needed unification of the instructional development profession.

Clearly, instructional developers must recognize their role as agents of change, both within their organizations and as members of a profession which concerns itself with innovation and change. The systems with which the instructional developer interacts change, so too must the instructional developer change - not merely in reaction to those changes, but as active, informed agents of change.

This present study has used the word "system" many times thus far, as cited by various authors in the instructional development profession, by authors from other fields (communication, business management, and others), and by the present writer. The numerous references to systems and to concepts derived from General Systems Theory are not simply coincidental. General Systems Theory has had a profound impact upon the theory and practice of instructional development. It is toward the application of General Systems Theory to instructional development that the present study now directs it attention.

Application of General Systems Theory to Instructional Development

This section of this present study briefly examines the application of General Systems Theory (GST) to the process of developing instruction. An in-depth discussion of General Systems Theory is neither desirable (given the purpose of this present study), nor feasible (given the limited scope of the present study). It is the intention of this writer, therefore, to provide a brief overview of the Theory, especially as regards open systems, and to briefly discuss some of the applications of the Theory. Next, a more focused examination of the application of General Systems Theory will be presented.

The reader who may not be familiar with the terminology of General Systems Theory is encouraged to refer to Appendix A (A Systems Glossary) and to use the glossary as needed in the reading of this section. Special effort has been made to provide definitions which would facilitate the understanding of this section for the reader who is new to systems terminology. The reader who is knowledgeable in General Systems Theory will not need to depend on the glossary to understand this section, but may wish to quickly review its contents, since many of the terms have no universally agreed upon definition.

General Systems Theory

Although Ludwig von Bertalanffy is generally recognized as the person most responsible for establishing the conceptual groundwork of General Systems Theory ("GST" or "the systems approach") and is considered its founder, the philosophical roots actually reach back in time from Aristotelian and Platonic universals, through the metaphysical philosophies of the Middle Ages, Newton's physical laws, the philosophy of Hegel, and the evolutionary theory of Darwin (Duncan, 1979; Rapoport, 1968). Bertalanffy himself claims that the idea of a "General Systems Theory" was first presented "in 1937 in Charles Morris' philosophy seminar at the University of Chicago" (Bertalanffy, 1962, p. 13). However, due to his perception that the time was not right for the presentation of his new theory, Bertalanffy postponed his first publications on GST until after World War II. The advent of operations research in British naval strategy doubtless encouraged this publication.

One of the greatest values of General Systems Theory (and a primary source of attraction for many of its adherents) is its conscious attempt to provide a framework under which unification of a variety of disciplines is conceptually possible. Rapoport (1968) explains that, as science became more specialized and scientific inquiry became more rigorous, the perspective of the scientist became narrower. What logically followed was that:

> The proliferation of disciplines, subdisciplines, and specialties threatened to fractionate the scientific community into mutually isolated enclaves unable to communicate with each other. Science threatened to become an avalanche of "findings" which in their totality no more add up to knowledge, let alone wisdom, than a pile of bricks adds up to a cathedral. The modern system point of view is a response to this threat....It is built on recent developments which show promise of reestablishing holistic approaches to knowledge without abandoning rigor. The analogies established or conjected in system theory are not "mere" metaphors. They are rooted in actual isomorphisms or homomorphisms between systems or theories of systems (xx-xxi).

This emphasis on the role of General Systems Theory, or the systems approach, in unifying diverse scientific disciplines is strongly supported in the systems literature (Bertalanffy, 1962; Bertalanffy, 1968; Boulding, 1956; Kast and Rosenzweig, 1970). Boulding (1956), for example, clearly articulates the value of the systems approach in promoting "communication among the disciplines" in order to overcome "the spread of specialized deafness" (p. 4).

Boulding submits that it is the "quest of General Systems Theory" to provide "a body of systematic theoretical constructs which will discuss the general relationships of the empirical world" (p. 3).

In order for General Systems Theory to aspire to such a challenging goal, Bertalanffy (1968) strongly advocates the training of "scientific generalists" who are able to transcend the boundaries of individual scientific disciplines. Bertalanffy argues:

> Conventional education in physics, biology, psychology or the social sciences treats them as separate domains, the general trend being that increasingly smaller subdomains become separate sciences, and this process is repeated to the point where each specialty becomes a triflingly small field, unconnected with the rest. In contrast, the educational demands of training "Scientific Generalists" and of developing interdisciplinary "basic principles" are precisely those general system theory tries to fill. They are not a mere program or a pious wish since...such theoretical structure is already in the process of development. In this sense, general system theory seems to be an important headway towards interdisciplinary sythesis and integrated education (p. 51).

General Systems Theory, like instructional development, exhibits the terminological difficulties inherent in any "new" discipline. As Beishon and Peters (1976) point out, "The establishment of an agreed vocabulary is... an essential step if effective communication is to be possible. Systems as a subject has been particularly prone to controversy and confusion about the meaning of its words" (p. 11). The cause for this confusion is largely due to the fact that the systems approach grew out of a multidisciplinary base. Sociologists do not share the vocabulary of physicists; psychologists are not always very fluent in the terminology of the engineer." Beishon and Peters (1976) also submit that there is often confusion between the terms "systematic" and "systemic."

> The former is used to describe the situation when we have a method or follow a plan or an explicit and rational procedure. It is a useful aid to achieving results efficiently in a wide range of activities. Systemic however, is rather different. It is a term which has been coined to refer to the activity of using systems ideas especially in attacking problems. It can be defined strictly as "pertaining to system" but it is generally used to refer to the process or activity of treating things as system or from a systems viewpoint. This, loosely speaking, means looking at situations, topics, problems, etc. as a complex of interacting parts which can be divided into specific systems, and within these, sub-systems, and if necessary into sub-sub-systems, and so on. Identification of these various systems is followed by an examination of the relationships among them and the flows of influences, materials and energy and the routes these take among and within the systems involved (p. 11).

Well, what then, is a system? There are almost as many definitions of "system" as there are systems thinkers. A few representative definitions will, therefore, have to suffice for the purposes of the present discussion. The definitions for "system" given below are followed by their respective authors.

System: a whole which functions as a whole by virtue of the interdependence of its parts (Rapoport, 1968, p.xvii).

System: a set of objects together with relationships between the objects and between their attributes connected or related to each other and to their environment in such a manner as to form an entirety or whole (author unknown, quoted in Beishon and Peters, 1976, p. 12).

System: a set of interacting functional relationships between various components which transforms a set of inputs into a set of outputs (Laszlo, et al., 1974, p. 79).

System: an assembly of parts where
1. the parts or components are connected together in an organized way
2. the parts or components are affected by being in the system and are changed by leaving it.
3. the assembly does something
4. the assembly has been identified by a person as being of special interest (Beishon and Peters, 1976, p. 12)

System: a set of interrelated elements (Ackoff, 1971, p. 106)

System: a set of elements standing in interrelation (Bertalanffy, 1968, p. 38)

System: (system as description) - the structure or organization of an orderly whole, clearly showing the interrelationships of the parts to each other and to the whole itself (Silvern in AECT/DID, 1979, p. 23).

System: (system as process) - a process which synthesizes and interrelates the components of a process within a conceptual framework, insuring continuous, orderly and effective progress toward a stated goal (Heinich in AECT/DID, 1979, p. 23).

Even after one has defined "system," the task of defining and analyzing any given system remains. Churchman (1979) declares that "when one is considering systems it's always wise to raise question about the most obvious and simple assumptions" (pp vi-viii). For example, how does one determine the parameters (boundaries) of the system to be studied? What consititutes the elements (components) of the system under consideration as distinguished from the system's environment? Is the system, as defined by the analyst, large enough to answer the questions of the analysis? Has it been too broadly defined? Churchman proposes "five basic considerations that... must be kept in mind when thinking about the meaning of a system":

1. the total system objectives and, more specifically, the performance measures of the whole system;
2. the system's environment: the fixed constraints;
3. the resources of the system;
4. the components of the system, their activities, goals and measures of performance;
5. the management of the system (p. 29).

While a detailed discussion of these considerations would be interesting, such discussion is beyond the scope of the present study. However, a few brief explanations are appropriate.

Regarding a system's objectives, the author points out the difference between "stated" objectives and "real" objectives. The scientist tests whether or not an objective is "real" by determining "whether the system will knowingly sacrifice other goals in order to attain the objective" (p. 31). The more precisely and specifically the objective is stated, the easier this determination becomes.

The scientist faces a similar problem in distinguishing the system from its environment. Where does the system end and its environment begin? A useful technique is to think of the environment, that which lies "outside" of the system, as something beyond the direct control of the system. "The system can do relatively little about its characteristics or its behavior" (p. 36). The environment also partly determines the performance of the system. In other words, the system does not control its environment, yet the environment affects the system's performance relative to its (the system's) objectives.

The resources of the system are "inside the system... the means that the system uses to do its job" (pp. 37-38). The system can control its own resources, manipulating them so as to use them to best advantage in achieving its goals. Information, energy and materials are usually regarded as the three major resources a system uses.

The components (or parts, or subsystems) of a system, says Churchman, are often best defined functionally; that is, in terms of specific system tasks which are performed in achieving the system's objectives. In this way, the performance of these components can more easily be measured

-- in terms of their respective functions. "The real reason for the separation of the system into components," says the author, "is to provide the analyst with the kind of information he needs in order to tell whether the system is operating properly and what should be done next" (p. 42).

Finally, the management of a system generates system objectives, sets component goals, allocates the system's resources, and controls the system performance (p. 45). This system management function is often referred to as the system "control" function. A vital concern to such a function is the availability of timely, accurate and appropriate information regarding all aspects of system functioning.

A glossary of systems terminology is provided in Appendix A.

Systems possess certain properties which serve to identify them as systems. One of the most important of these properties is holism. Kast and Rosenzweig (1970) explain.

> Holism is the view that all systems - physical, biological, and social -- are composed of interrelated subsystems. The whole is not just the sum of the parts, but the system itself can be explained only as a totality. Holism is the opposite of elementarism, which views the total as the sum of its individual parts. The holistic view is basic to the systems approach (p. 17).

Bertalanffy (1968) maintains that the holistic approach to modern science is essential, since the modern scientist must "think in terms of systems of elements in mutual interaction" as opposed to supposing some "scheme of isolable units acting in one-way causality" (p. 45). Bertalanffy also emphasizes such systems properties as teleology, the state of being goal-oriented; and adaptiveness, "the ability of a system to modify itself or its environment when either has changed to the system's disadvantage so as to regain at lease some of its lost efficiency" (Ackoff, 1971, p. 110).

It is beyond the scope of this present study to examine the properties of systems in any detail. However, Jenkins (1969) provides a useful "summary of properties of systems." This summary may be found in Table 8.

From this brief general examination of the literature of systems thinking, the present study moves to a further exploration of the open system concept, since this is the type of system which will be of concern when a systems approach to instructional development is discussed in this study. Again, it must be emphasized that an extensive examination is beyond the scope of the present study. Therefore, it is hoped that this section will provide a conceptual overview of open systems and the value of

Table 8. SUMMARY OF PROPERTIES OF SYSTEMS

1. A system is a *complex grouping* of human beings and machines.

2. Systems may be broken into *sub-systems*, the amount sub-system detail depending on the problem being studied. *Flow-block diagrams* provide a readily understood way of describing these sub-systems.

3. The *outputs* from a given sub-system provide the *inputs* for other subsystems. Thus the performance of a given sub-system *interacts* with the performance of other sub-systems and hence can not be studied in isolation.

4. The system being studied will usually form part of a *hierarchy* of such systems. The systems at the top are very important and exert considerable influence on the systems lower down.

5. To function at all, a system must have an *objective*, but this is influenced by the wider system of which it forms part. Usually, systems have multiple objectives which are in conflict with one another, so that an *overall objective* is required which effects a compromise between these conflicting objectives.

6. To function at maximum efficiency a system must be *designed* in such a way that it is capable of achieving its overall objective in the best way possible.

SOURCE: G.M. Jenkins, The systems approach. In J. Beishon and G. Peters (Eds.), *Systems Behavior* (2nd edition). New York: Harper & Row Publishers, 1976, p. 82. (Reprinted from *Journal of Systems Engineering*, 1969, *1*, 1) viewing various entities as open systems.

The Concept of Open Systems

Davies (1976) distinguishes open systems from closed systems in the following manner:

> Closed systems are totally isolated from and independent of their environment; they are static, predictable, and ultimately tend towards a state of equilibrium, stillness, inactivity. An open system is defined as a system in exchange of matter with its environment, importing and exporting energy, building up and breaking down its own component parts. Although stable, open systems are always changing, always evolving; although identifiable, classifiable, they present differences over time and in changing circumstances(p. 281).

Katz and Kahn (1978) describe the ten characteristics which seem to define all open systems. These are: importation of energy; thoughput (transformation of energy; work); output (into the environment); a dynamic structure which facilitates a "cycle of events"; negative entropy (or negentropy); information input, negative feedback (to correct deviation) and a coding process (the selective reception of inputs); the steady state and dynamic homeostasis (referred to by some authors - e.g. Kast and Rosenzweig, 1979, p. 22 - as "dynamic equilibrium"); differentiation; integration and coordination (the counter-force to differentiation by which system processes are functionally unified); and equifinality (pp. 23-30).

Other authors (Bertalanffy, 1968) also provide detailed explanations of these open systems characteristics as well. Ackoff (1971) discusses various kinds of adaptive behavior exhibited by open systems. Kast and Rosenzweig (1970) also discuss adaptation, as well as the concepts of negentropy, dynamic equilibrium, system boundaries, interface with the environment, feedback, differentiation of both the system as a whole and its subsystems toward a higher level or organization, and equifinality. Kast and Rosenzweig also present a convincing argument for the necessity of viewing organizations as complex, open systems.

Katz and Kahn (1978) warn of some of the misconceptions which arise both in theory and practice when social organizations are regarded as closed rather than open systems. The first misconception is "the failure to recognize fully the dependence of organizations on inputs from their environment [and that] that inflow of materials and energy is neither constant nor assured" (pp. 30-31). A second misconception brought about by a closed system perspective of organizations is "overconcentration on principles of internal functioning... Internal moves are planned without regard for their effects on the environment and the consequent environmental response" (pp. 32-33). Third, closed systems thinking leads to "the neglect of equifinality" and the insistence that there is "one best way" to achieve an objective (p. 32). Fourth, the closed systems perspective treats functional irregularities in the system due to environmental influences as "error variances," instead of treating these environmental forces as "integral to the functioning" of the system (p. 32). Finally, closed systems thinking about organizations fails to "understand and develop the feedback or intelligence function, the means by which the organization acquires information about changes in the environment" (p. 33).

The management function (or control function) in an open system is discussed in detail by Kast & Rosenzweig (1970). This management system is divided into the technical core level, the organizational level, and the institutional level (the latter being the broadest in scope, or the "highest" level). The authors submit that management at each of the three levels involves performing different type tasks, taking different points of view, using different management techniques, accepting different time frames, and utilizing different strategies in decision making.

The use of an open systems perspective in studying organizations, as the various authors in this discussion have illustrated, has proven to be valuable in understanding, defining, analyzing and developing organizations.

But General Systems Theory has had widespread application in a diversity of areas. Kast and Rosenzweig (1970) discuss the applications of GST in the social sciences, management, the military,and various levels of government. Churchman (1979) explains how the systems approach can be used in such areas as manufacturing, transportation, program planning and budgeting (PPB), management information systems (MIS), urban planning, and education. Jenkins (1969) presents a four-stage systems approach to problem solving. Filbeck (1974) discusses a systems approach to developing instructional materials.

It is with this last application of General Systems Theory, its application to the development of instruction, that this present study is most concerned and to which it is now directed.

Instructional Development as an Open System

This present study now addresses itself to the following questions:

1. How have the concepts and procedures of General Systems Theory (the systems approach) been applied to the development of instruction?
2. How can instructional development be viewed as a system?
3. How have systems concepts and procedures been applied to the development of instructional systems?
4. What are the benefits of adopting a systems approach to instructional development, especially

> an approach which views instructional development as an open system?

Duncan (1978) reports that instructional development is so closely identified with the systems approach in the ID literature that, "the systems approach is sometimes defined in the same terms used to define instructional development" (p. 22). Indeed, the process of developing instruction is analogous to the systems approach to solving problems in a variety of other fields. Kemp (1977) discusses this analogous relationship in terms of systems approach applications to problem-solving in business, industry, the military, and space exploration (p. 6), a discussion which reinforces Jenkins' (1969) previously cited explanation of the use of systems concepts in systems analysis and systems engineering. Twelker, Urbach and Buck (1972) submit that it is most accurate to think of the systems approach to instruction as a "systematic way of identifying, developing and evaluating a set of materials and strategies aimed at accomplishing a particular goal" (p. 113).

It is one thing to cite examples of how instructional development uses a systems approach. But can instructional development itself be viewed as a system? The literature indicates that, not only is it possible to view ID as a system; it is inevitable that it be viewed as such. Duncan

(1978) asserts that, "Instructional development is a system in the sense that system theories are basic to the development process... Utilization of all available resources implies the creation of a man-machine system... In this type of system, man attempts to maximize the minimum, i.e., the resources" (p. 22). Gustafson (1971) is more explicit, describing instructional development in terms of some of the major properties of a system (an open system). First, the instructional development process has "no beginning or end" (p. 2). The problem exists before it is ever called to the attention of the instructional developer. The process does not end, in the sense that revision will always be needed in view of changing needs of students, shifting environmental conditions and other factors. Second, the individual components or steps of the ID process exhibit an interdependence upon one another (p. 3). The actions of one component affect other components. Third, Gustafson submits that "all functions must receive varying amounts of attention and effort simultaneously if the process is to survive i.e., progress" (p. 4). Gustafson is referring to the dynamic, interactive nature of the instructional development process. The development of instruction does not follow a simple, linear path from problem awareness to revision and implementation of instruction. Fourth, the process must be flexible (p. 4), allowing for quick and effective adaptation to unforseen contingencies. Also, more than one path toward reaching the final goal must be available; and the goal should be attainable by starting from more than one point in the process (i.e., Instructional development must, as a system, possess equifinality). Finally, says Gustafson, information must flow freely among the system's components. In fact, says Gustafson, "There is no more important element to consider when planning an ID project than designing, maintaining and redesigning the information transfer network within the system and with its external interfaces" (p. 5).

Dick and Carey (1978) point out that, although "the systematic approach to instruction had its initial impact on the development of programmed instruction.... many of these principles are applied today in systematic design of instructional materials" (p. 3).

Application of the systems approach to instructional development has been advocated in virtually every area in which instructional development is practiced. Razik (1972) speaks of widespread use of the systems approach in education, noting that:

> It is now apparent that highly creative and successful solutions to the planning problems of educational systems can be developed through such an approach. Because the systems approach employs highly adaptive methodology it can be utilized to solve a wide variety of educational problems. It has been found to be particularly useful in dealing with the

> qualitative aspects of educational problems and planning (p. 10).

Branson (1977) discusses the systems approach in military and industrial training and points out its advantages in terms of the effectiveness and efficiency of the resultant training -- two extremely important considerations in military and industrial settings. The systems approach has been used in a variety of other areas (Briggs, 1977; Gagné and Briggs, 1979), but detailed examination of those applications must be left for other studies.

Gustafson (1971) differentiates among using a systems approach to instructional development, applying systems theories to the ID process, and viewing the "resulting products of an ID effort as an instructional system" (p. 6). An instructional system, according to Carey and Briggs (1977), may be defined as "the total 'package' of materials, tests, student guides, and teacher guides that is needed to reach the goals for any instructional unit, course, or curriculum, along with all supporting activities and processes required to operate the system as it was designed to be operated" (p. 262). Razik (1969) further specifies that an instructional system must be viewed as a "man-mahine" system (p. 7) since the instructional system requires "the interrelationship and joint functioning of man and machine in the accomplishment of a particular goal" (p. 8). Gagné and Briggs (1979) provide a detailed discussion of the various stages involved in the design of instructional systems. These stages are illustrated in Table 9. The stages proceed from the broad, system level considerations of the analysis of system needs, goals, and priorities, through course-level and lesson-level issues. The process then shifts back to the system level in its final stage. The authors caution, however, that "although the stages are listed... as discrete steps shown in a sequential, linear fashion, emphasis was placed on the iterative nature of the design process. This is to say, in practice there is much working backwards and forward in a non-linear fashion, because work done at any one stage gives new insights into other stages" (p. 40). Although other descriptions of the stages or functions of instructional systems may be found elsewhere in the literature (Robb, 1974), few are as thorough as that provided by Gagné and Briggs (1979).

What are the benefits to be derived from adoption of a systems approach to instructional development, specifically one which views instructional development as an open system?

Gagné and Briggs submit that:

> Much systematic thinking and planning go into the design effort, making use of all theory and research evidence available, and that this planning can be supplemented by the iterative, self-correcting process of empirical tryout and revision. The entire process...is closer to a science of

Table 9. STAGES IN DESIGNING INSTRUCTIONAL SYSTEMS

System Level

1. Analysis of Needs, Goals, and Priorities
2. Analysis of Resources, Constraints, and Alternate Delivery Systems
3. Determination of Scope and Sequence of Curriculum and Courses; Delivery System Design

Course Level

4. Determining Course Structure and Sequence
5. Analysis of Course Objectives

Lesson Level

6. Definition of Performance Objectives
7. Preparing Lesson Plans (or Modules)
8. Developing, Selecting Materials, Media
9. Assessing Student Performance (Performance Measures)

System Level

10. Teacher Preparation
11. Formative Evaluation
12. Field Testing, Revision
13. Summative Evaluation
14. Installation and Diffusion

SOURCE: R.M. Gagné and L.J. Briggs, *Principles of instructional design (2nd edition)*. New York: Holt, Rinehart and Winston, 1979, p. 23.

> education than are other approaches to the design of instruction which do not include measurement of their effects. The ability to determine whether the system has met its design objectives -- whether student performance shows that needs were met -- provides the basis for accountability in results (p. 21).

Borich and Jemelka (1981) echo similar findings in specifying four major benefits which they feel can be attributed to a systems approach:

> 1. The systems perspective can be used in considering the relationship of a particular instructional program to its environmental conditions and in identifying contextual factors and variables that affect the program.
> 2. The systems perspective can be used to identify inconsistencies in objectives when treating the various agents that play a part in different instructional programs within the same system.
> 3. The systems perspective provides a framework in which performance of the various programs, subprograms, and the whole system can be evaluated.
> 4. The systems perspective and its attendant methodology can be used to test the relative worth of alternative programs within the same system. (p. 36)

Good (1975) stresses the application of the systems concept of wholeness (holism) in pointing out that "developing a holistic or system-conscious approach, and watching carefully for side effects, is a vital part of the concept of systematic development" (p. 35). Good further emphasizes the importance of the adaptive nature of the systems approach to instructional development, calling it the "sine qua non of effective adaptation and adjustment to minimal resources"

(p. 37).

The benefits of a systems approach have been delineated by other authors as well. Razik (1969) discusses systems approach benefits for the educator. Branson (1977) reports on the proven advantages of using the systems approach in military and industrial training.

Boutwell (1979) testifies to the benefits derived from the synergistic and cybernetic functions of the systems approach, explaining that the components of the instructional development process are "synergistic in that the interactive relationship of the components strengthens the entire development process" (p. 32), and that the ID process is "cybernetic in that the cyclic effect of evaluative feedback continually modifies the input variables" (p. 32).

Razik (1972) also stresses the importance of feedback in the instructional development process, noting that it provides a "corrective mechanism" (p. 24) for modification of systems components. Razik also provides a brief discussion of some of the objectives which are commonly raised against a systems approach to instruction, and then proceeds to invalidate those objections (pp. 59-60).

Duncan (1978) also points out the application of cybernetics and equifinality. He maintains that:

> The constant monitoring and assessing of development efforts is important if wise decisions are to be made in choosing among development alternatives. It thus appears that instructional development is inextricably bound to the notion of equifinality... since it affords means by which one can identify, in a systematic manner, various paths toward the goal of improving the quality of instruction and thus learning (p. 22).

Clearly, the literature indicates many worthwhile applications of the systems approach in the development of instruction. These applications are possible in virtually every setting in which instructional development is conducted. Previous discussion of the literature also strongly supports the contention that instructional development should be viewed as a system and, more specifically, as an open system. The concepts of holism adaptation, equifinality, dynamic interaction among system components, and environmental interface were especially prevalent in discussion of the authors cited.

It now remains for this present study to more clearly examine the extent to which the systems approach has been utilized in the conception and evolution of some of the major models of instructional development now in use.

It is to an examination of these models that this present study is now directed.

Models of Instructional Development

Silvern and Heinich (AECT/Task Force on Definition and Terminology, 1979) define a model as:

> A conceptualization in the form of an equation, a physical device, a narrative, or a graphic analog representing a real-life situation either as it is or as it should be. It is not the original situation but a replica of it; the more faithful the replica, the better the model. There are two types: models of--explanation; models for -- prescription. (p. 16)

Models, as representations of some "reality" or as prescriptions for some "ideal" (or, at least, improvement) are, by definition, imperfect creations. Haggett (1965) explains that "models are made necessary by the complexity of reality" (p. 315). Further, models cannot convey the "whole truth" but only a "useful and comprehensible part of it" (p. 315). Ashby (1970) confirms this notion, maintaining that, "There is no such thing as the true model of ... a complex system .... Complex systems are capable of providing a great variety of models, with no one of them able to claim absolute priority" (p. 97). Ample references in the literature discuss various limitations of models (Ashby, 1979; Haggett, 1965; Melton, 1982; Rubinstein, 1975; Stogdill, 1970).

Since models are, by definition, such imperfect creations, why bother to build them at all? Haggett (1965) suggests three reasons for building models. First, model building is "inevitable because there is no fixed dividing line between facts and beliefs..." (p. 317). It is "economical" in that it "allows us to pass on generalized information in a highly compressed form..." (p. 317-318). Finally, "model building is stimulating in that, through its very over-generalizations, it makes clear those areas where improvement is necessary" (p. 318).

Models, then, serve as necessary and economical (albeit imperfect) media through which complex realities or prescribed realities may be represented.

Instructional development is certainly a complex reality. It may also be viewed (as previous discussion in this present study has pointed out) as a process and as a system. Thus, instructional develeopment lends itself quite readily to modeling. Consequently, there are a great number of models of instructional development (and/or instructional design -- the distincition is often less than explicitly defined by their authors). Some authors (Andrews and Goodson, 1980; Gustafson, 1981) believe that there are too many existing ID models. Andrews and Goodson (1980), for example, claim that "a strong argument can be made that the larger number of extant models is not only confusing, but also often wasteful of the resources over which educators and project directors have command" (p. 14).

Gustafson (1981) testifies that "all developers recognize the need for adaptation of models to local situations" (p. 3), but like Andrews and Goodson (1980), Gustafson admits that this adaptation is not carried out to the degree it should be carried out. Instead, developers often prefer to "start from scratch" and create their own models -- thus, the confusion and wastefulness referred to by Andrews and Goodson (1980).

To date, no "perfect" model of instructional development has been created, even for any given instructional setting. This is supported by Durzo, Diamond and Doughty (1979) who report that:

> The question of which instructional development model is most appropriate for a setting is one which has not yet been answered and may never be adequately answered. Each institution follows a set of procedures linked to the experiences of the development staff and the setting in which they are working (p. 9).

Gustafson (1981) indicates that the model chosen by instructional developers largely depends on the perspective from which they view instructional development. Basically, claims Gustafson, there are three perspectives. The first perspective is that of General Systems Theory, in which "the ID process itself is viewed as an integrated system with numerous interacting elements. As a consequence, the models stress communication, feedback, and prediction of the effect of one action on other parts of the system"

(p. 3). The second perspective is "systematic development," in which careful description of specific tasks to be performed is stressed. The model by Hamreus (1968) is cited as an example of this perspective. The third perspective is the "prescriptive view." Models which are created from this perspective read like a series of "if-then" statements (p. 3).

Gustafson (1981) logically proceeds to a discussion of the major uses of ID models. Primarily, models of instructional development are used by ID practitioners as:

1. communication devices with their clients and each other,
2. planning guides for management activities, or
3. prescriptive algorithms for decision making (p. 4).

The purposes listed above can overlap, claims Gustafson, but generally the models "tend to focus on a single function" (p. 4).

The above three perspectives on instructional development listed by Gustafson appear to correlate with the three primary uses of ID models. A General Systems perspective would seem to lead to using ID models primarily as communication devices, as opposed to management planning guides (the "systematic development" perspective with its careful delineation of specific tasks) or "prescriptive algorithms for decision making" (i.e., the "prescriptive perspective" with its logical but deterministic series of "if-then"statements). Previous discussion in the present study may lead the reader to believe that the General Systems perspective is favored in this study. In fact, for the many reasons discussed in the previous section of this chapter (application of General Systems Theory to Instructional Development), such a conclusion would not be unwarranted. The previously discussed advantages of the systems approach to ID (especially an open systems view) should be considered in reading the following comments by Borich and Jemelka (1981):

> General systems theory holds that the complexity of any system, including instructional programs, cannot be understood through analytic reduction and experimental control. Rather, instructional programs are viewed as organismic entities that evolve and decay, depending on their relationship to other programs and the larger context to which they contribute. Further, because all parts of instructional programs are ultimately seen as interrelated, changes in any particular component have implications throughout the larger system of which the changed component is a part. Within this perspective, there is no such thing as an "independent" variable. Everything is ultimately related to everything else (p. 35).

Boutwell (1979), while clearly indicating his preference for systems models of instructional development, adds a valuable warning to this present discussion by pointing out that, "Many systems models only pay 'lip service' to the larger systems issues e.g., diffusion, management, training or educational environment, selection of participants and implementation" (p. 32).

Boutwell (1979) states that most models of instructional development can be "reduced to five functional phases. Unfortunately, the operational definition of these components differs in content and procedures across models" (p. 32). These five functional phases are: Needs Analysis, Design, Development, Implementation, and Evaluation. Boutwell is also quite correct in pointing out that precise definitions of these phases (and what activities should be subsumed under each phase) are lacking. Durzo, Diamond and Doughty (1979) would reduce the number of "functional phases" of instructional development to three: Design, Implementation and Evaluation (p. 4).

The great number of instructional development (and "design") models which exists makes any conscientious and meaningful synthesis of these models extremely difficult. The problem is compounded by the different terminology used by various authors, the difficulty in separating models of instructional development from models of instructional design (the two terms are often used synonymously -- even by some well-known authors in very recent articles and texts), and by the difficulty in classifying the existing models using some reasonable framework and comparing them on some representative set of criteria.

An examination of existing models of instructional development (and "design") in the literature revealed more than seventy (70) models which might be relevant to the present discussion. However, since this present study is concerned only with models with explicitly utilize the systems approach, the number of ID models appropraite for this present study was greatly reduced. Other models were eliminated from consideration because they clearly failed to adhere to commonly accepted guidelines (even very broad guidelines) for instructional development models. For example, any model which did not explicitly provide for evaluation of both learners and the instruction itself was eliminated from consideration, as was any model which did not explicitly provide for the revision of instruction. Some of the models which were clearly intended for use in formal educational environments held little or no hope of application in non-educational settings (e.g., training in business or industry) and were eliminated from consideration in this discussion, as were some models intended for training environments which had little or no direct application to formal educational settings. Naturally, "models of teaching" and "models of learning" were also not considered since, by definition (Gagné and Briggs, 1974, pp. 3-4), they are not models of instructional development.

The six models selected for this present discussion all meet the criteria set forth above. Since the majority of instructional development models originate from academic (formal educational) sources, two of the models are primarily oriented in that direction (Diamond et al., 1975; and Kemp, 1977). One of the models is primarily oriented toward a training environment (Branson, 1975). The other three models were judged by this writer (based on statements made by the respective authors, as well as on the characteristics of the models themselves) to be equally applicable to either formal education or training environments (Dick and Carey, 1978; Gagné and Briggs, 1979; and Hamreus, 1968). This present study will be concerned with a brief examination of the major attributes of these models and a brief comparison among the models. The reader who wishes to pursue a more detailed study of models of instructional development (which is well beyond the scope of present study) is encouraged to begin with the excellent reviews of ID models provided by Andrews and Goodson, 1980; Gustafson, 1981; Stamas, 1973; and Twelker, Urbach and Buck, 1972.

This present writer was faced with one very important question regarding the six ID models selected. Were they representative of the systems approach models now in use?

The previously discussed criteria for selection served well as "filters' for the elimination of the many models of instructional design/development which were not appropriate for consideration in the present study. However, a number of ID models managed to survive this filtering process. The issue, then, was to select a few models which would represent the appropriate candidate models regarding certain relevant and indentifiable characteristics. The six models which where chosen, considered together, possess the following attributes:

1. The models are all currently widely-used.
2. The models all use the "systems approach" as their explicitly stated theoretical base.
3. Primary applications for the models include education and training, as well as models which are applicable in either environment.
4. The models' levels of application include both the "lesson/module" level and the broader "course/curriculum/instructional system" level.
5. The models cover the time period between 1968 and 1979, the period of greatest ID model proliferation.

A brief overview of the six selected models is provided in Table 10.

The reader who wishes to pursue detailed examination of any specific model is encouraged to refer to the primary reference for the particular model, since detailed examination of any model is neither the purpose of this present study nor within its scope. Rather, this present study will attempt to highlight the major characteristics

Table 10. THEORETICAL BASE, PRIMARY APPLICATION, AND PRIMARY LEVEL FOCUS OF SIX SELECTED ID MODELS

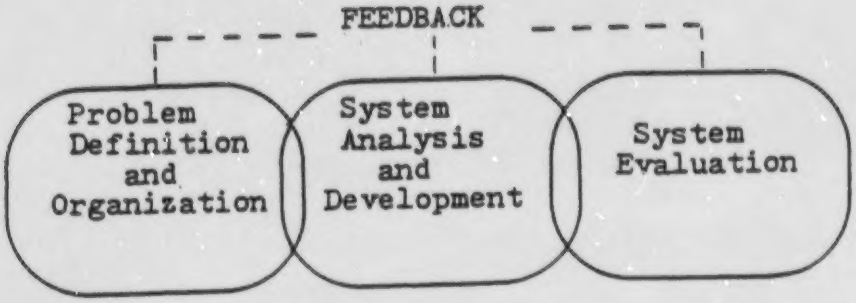
Model/Author	Primary Application	Primary Level Focus
Interservice Procedures for Instructional Systems Development Model (Branson, 1975)	Training	Course/ Curriculum/ Instructional System Level
Syracuse Model (Diamond et al., 1975)	Education	Course/ Curriculum/ Instructional System Level
Dick and Carey (1978)	Training and Education	Lesson/Module Level
Gagné and Briggs (1979)	Training and Education	Course/ Curriculum/ Instructional System Level
Teaching Research (Hamreus, 1968)	Training and Education	Course/ Curriculum/ Instructional System Level
Kemp (1977)	Education	Lesson/Module Level

NOTE: All six models employ the Systems Approach as their explicitly stated theoretical base.

of each model and to point out those differences among the six models which are most relevant to this discussion.

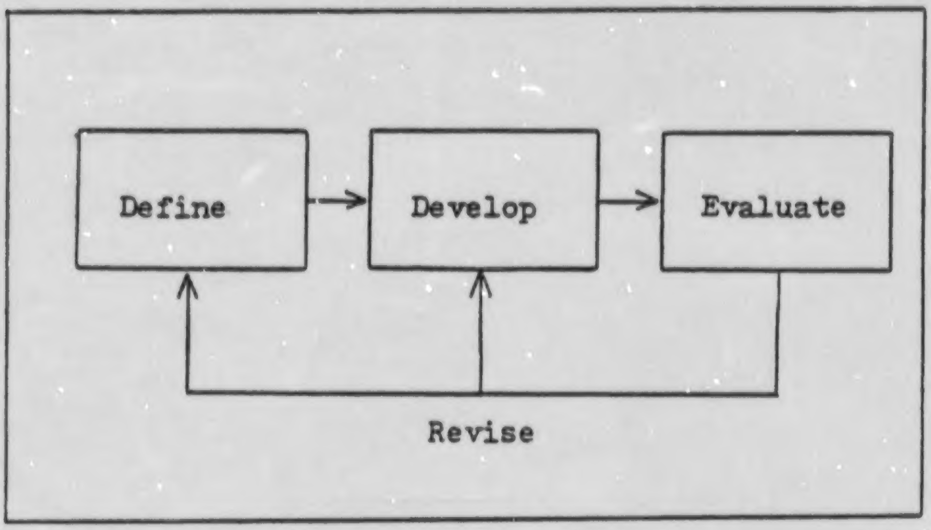
Models of instructional development, in general, address basic phases or stages in the ID process. These phases or stages differ from model to model insofar as specific terminology used and the specific steps (or procedures, or tasks) included in each phase. Again, the absence of a commonly used body of terminology is a source of "noise" in attempting to understand the instructional development process and in attempting to communicate commonalities and differences among ID models, even at the most general levels. Twelker, Urbach and Buck (1972), for example, offer a general model of the phases in the development of an instructional system. These phases, represented graphically in Figure 8, are labelled "Problem Definition and Organization," "System Analysis and Development," and "System Evaluation," The model indicates that these three phases are interconnected (in a linear fashion) and are further joined by "Feedback" loops. A similar model is presented by Durzo, Diamond and Doughty (1979) in Figure 9. These authors label the three major phases of the ID process "Define," "Develop," and "Evaluate." A further provision is made to "Revise" the process as a result of information obtained in the "Evaluation" Phase (for revision of either or both of the first two phases)

Figure 8. GENERAL MODEL OF AN INSTRUCTIONAL SYSTEM


FEEDBACK
Problem Definition and Organization
System Analysis and Development
System Evaluation

SOURCE: P.A. Twelker, F.D. Urbach and J.E. Buck, The systematic development of instruction: an overview and basic guide to the literature. Stanford, California: Stanford University, ERIC Clearinghouse on Media and Technology, 1972, p.2.

Figure 9. SYSTEMATIC APPROACH TO INSTRUCTION
(a simple model)

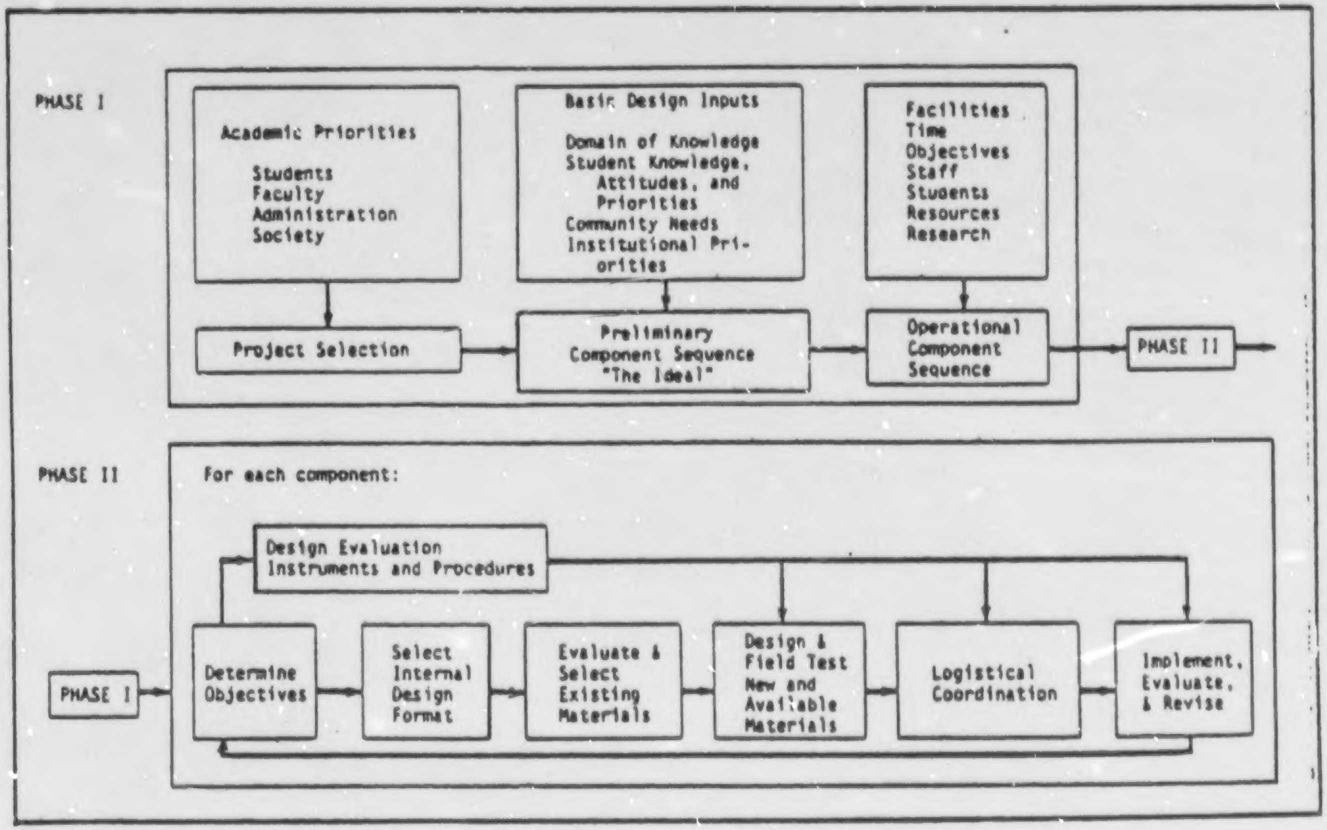


SOURCE: J.J. Durzo, R.M. Diamond, and P.L. Doughty, An analysis of research needs in instructional development. Journal of Instructional Development. 1979, 2 (4), p. 8.

or information obtained in the "Develop" phase (for revision of the "Define" phase). While the two models are almost identical, the slight difference in terminology and structure should be noticed. The above two single models represent the framework upon which the six models selected for presentation in this study elaborate. A brief examination of these six models will now be presented, starting with the two models which are primarily oriented toward education environments (i.e., Diamond et al., 1975; and Kemp, 1977), proceeding to the training-oriented model by Branson (1975), and to the models which are readily applicable in either environment (i.e., Dick and Carey, 1978; Gagnè and Briggs 1979; and Hamreus, 1968).

The Syracuse Model for Course and Curriculum Design, Implementation, and Development (Diamond et al., 1975) is illustrated in Figure 10. This model was developed for large-scale course and curriculum development, primarily in institutions of higher education, although it has been applied to other environments as well (Diamond, 1980). Among the model's major strengths are its flexibility, its sensitivity to the politics of institutions of higher education, its refusal to formulate pre-determined solutions to instructional needs, its economical use of resources, and its ability to facilitate rapid implementation of instruction (Diamond, 1980).

Figure 10. THE SYRACUSE MODEL FOR COURSE AND CURRICULUM DESIGN, IMPLEMENTATION, AND EVALUATION


PHASE I
Academic Priorities
Students
Faculty
Administration
Society
Basic Design Inputs
Domain of Knowledge
Student Knowledge, Attitudes, and Priorities
Community Needs
Institutional Priorities
Facilities
Time
Objectives
Staff
Students
Resources
Research
Project Selection
Preliminary Component Sequence "The Ideal"
Operational Component Sequence
PHASE II
PHASE II
For each component:
Design Evaluation Instruments and Procedures
PHASE I
Determine Objectives
Select Internal Design Format
Evaluate & Select Existing Materials
Design & Field Test New and Available Materials
Logistical Coordination
Implement, Evaluate, & Revise

SOURCE: R.M. Diamond, The syracuse model for course and curriculum design, implementation, and evaluation. Journal of Instructional Development. 1980, 4 (2), p. 21.

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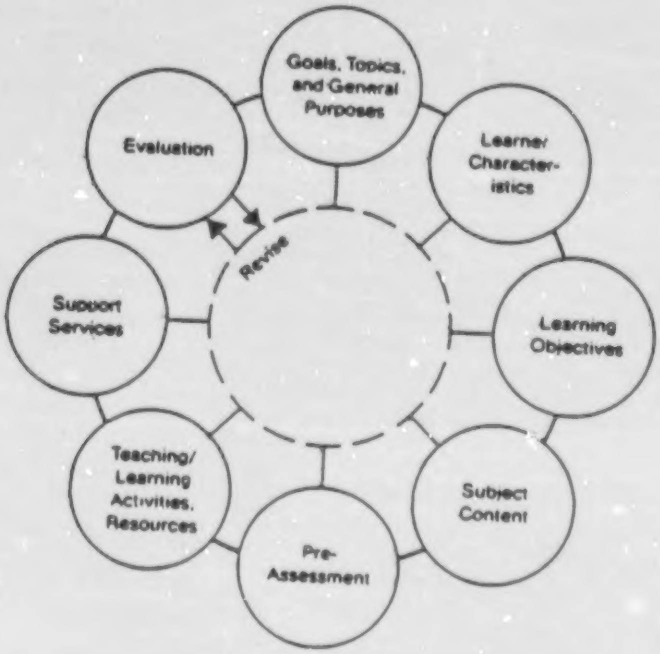
The Syracuse model is divided into two phases. Phase I (Design) includes three elements: Project Selection, Preliminary Component Sequence -- "The Ideal," and Operational Component Sequence. Each of these elements receives various inputs and requires various tasks and procedures for its completion. Phase II (Production, Implementation, and Evaluation) includes seven elements: Determine Objectives; Design Evaluation Instruments and Procedures; Select Internal Design Format; Evaluate and Select Existing Materials; Design and Field Test New and Available Materials; Logistical Coordination; and Implement, Evaluate, and Revise. Again, each of these elements requires various tasks and procedures for its completion.

The model developed by Kemp (1977) provides an interesting contrast to the Syracuse model (Diamond et al., 1975). The Kemp model, illustrated in Figure 11, is also oriented to an educational environment, although not primarily to higher education. Whereas the Syracuse model is applicable to large-scale development projects (cf., Table 10), the Kemp model is primarily intended for use in the development of relatively small-scale projects (i.e., lesson and module level). Kemp (1977) claims that one of the major strengths of his model is its flexibility and the interdependence among the eight steps. He states:

Figure 11. THE INSTRUCTIONAL DESIGN PLAN



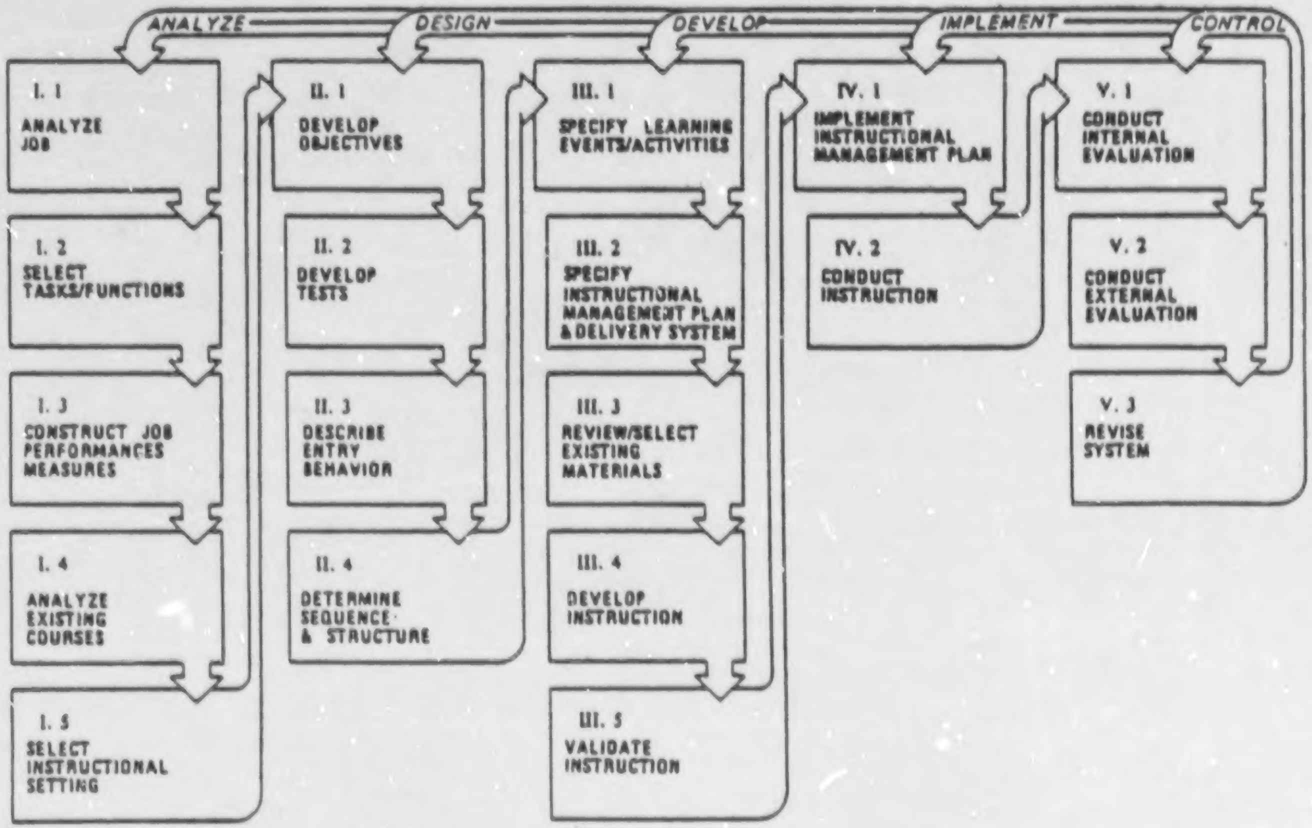
SOURCE: J.E.Kemp, Instructional design. Belmont, California: Fearon Publishers, 1977, p. 9.

> There is an interdependence among the eight elements; decisions relating to one may affect others. You can start with whichever element you are ready to start with and then move back and forth to the other steps. The sequence and order are your choice. Eventually, however, you should treat most of the eight (p. 9).

The Kemp model consists of eight steps: Goals, Topics, and General Purposes; Learner Characteristics; Learning Objectives; Subject Content; Pre-Assessment; Teaching/Learning Activities, Resources; Support Services; and Evaluation. These are essentially task-level components and further breakdown, unlike in the Syracuse model, is not needed for the most part. Arrangement of the steps in a circular manner is intended to suggest the ability of the user to begin at any step in the process. This arrangement also lends itself to emphasis of the equal importance of the steps and the interdependence among them.

The Interservice Procedures for Instructional Systems Development (IPISD) Model, illustrated in Figure 12, was developed between 1973 and 1976 in response to the need for an ID framework, process, and terminology base which could be used by all branches of the Armed Forces. The model is presented here in its most current form (Branson, 1975). The history of the development of the IPISD model is presented elsewhere (Branson, 1981; Branson, 1978). However, four interesting points deserve mention in the

Figure 12. INTERSERVICE PROCEDURES FOR INSTRUCTIONAL SYSTEMS DEVELOPMENT (IPISD) MODEL


ANALYZE
DESIGN
DEVELOP
IMPLEMENT
CONTROL
I. 1 ANALYZE JOB
I. 2 SELECT TASKS/FUNCTIONS
I. 3 CONSTRUCT JOB PERFORMANCE MEASURES
I. 4 ANALYZE EXISTING COURSES
I. 5 SELECT INSTRUCTIONAL SETTING
II. 1 DEVELOP OBJECTIVES
II. 2 DEVELOP TESTS
II. 3 DESCRIBE ENTRY BEHAVIOR
II. 4 DETERMINE SEQUENCE & STRUCTURE
III. 1 SPECIFY LEARNING EVENTS/ACTIVITIES
III. 2 SPECIFY INSTRUCTIONAL MANAGEMENT PLAN & DELIVERY SYSTEM
III. 3 REVIEW/SELECT EXISTING MATERIALS
III. 4 DEVELOP INSTRUCTION
III. 5 VALIDATE INSTRUCTION
IV. 1 IMPLEMENT INSTRUCTIONAL MANAGEMENT PLAN
IV. 2 CONDUCT INSTRUCTION
V. 1 CONDUCT INTERNAL EVALUATION
V. 2 CONDUCT EXTERNAL EVALUATION
V. 3 REVISE SYSTEM

SOURCE: R.K. Branson, The Interservice procedures for instructional systems development. *Educational Technology*, March 1978, p. 13.

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present discussion. First, the model was developed by a group of highly respected and experienced instructional development professionals, both military and civilian. Second, the model has been applied to non-military training environments with a great deal of success. Finally, the model is unusually detailed. Therefore, adoption of the model is facilitated. Finally, one of the major strengths of the model (in addition to its broad applicability and great attention to detail) is its emphasis not only on "quality control" -- ensuring that instruction is effective, but on "quality assurance"-- ensuring that the material presented is the right material in terms of needs analysis, job analysis and task analysis (Branson, 1981). This continual validation of instructional material was not explicitly advocated in any of the other models examined for this present study.

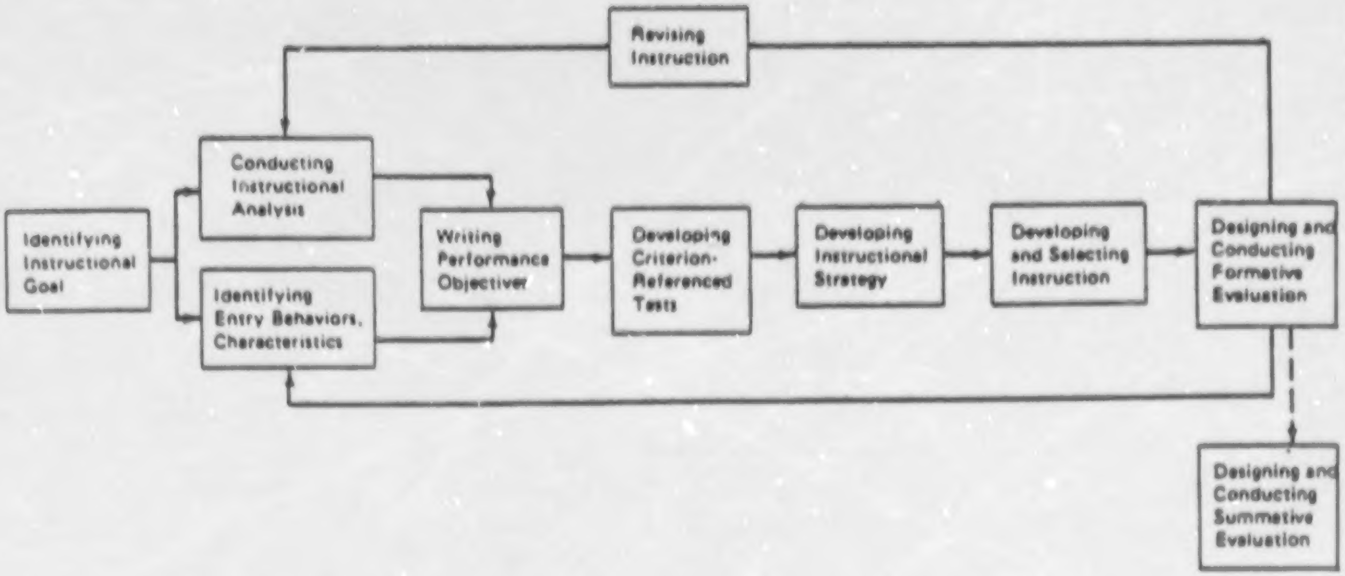
The IPISD model is comprised of the following five phases and their respective steps: Phase I: Analyze (Analyze Job, Select Task/Functions, Construct Job Performance Measures, Analyze Existing Courses, and Select Instructional Setting); Phase II: Design (Develop Objectives, Develop Tests, Describe Entry Behavior, and Determine Sequence & Structure); Phase III: Develop (Specify Learning Events/Activities, Specify Instructional Management Plan and Delivery System, Review/Select

Existing Materials, Develop Instruction, and Validate Instruction); Phase IV: Implement (Implement Instructional Management Plan, Conduct Instruction); Phase V: Control (Conduct Internal Evaluation, Conduct External Evaluation, Revise System).

The model developed by Dick and Carey (1978) is illustrated in Figure 13. Although the authors rely heavily on examples from education in the discussion of their model, they assert that the model is applicable in other settings as well. Examination of their model tends to confirm this assertion, as long as the primary level of application does not extend beyond small-scale development efforts (i.e., lesson/module level). While their model is certainly operational, the authors maintain that it is also intended "to teach the skills associated with instructional design and evaluation processes, with considerable emphasis also given to the application of these skills to the selection of instructional materials, the development of lesson strategies, and the implementation of instruction in the classroom" (p. 5).

The Dick and Carey model is made up of nine components. Although these components are not arranged under broader "phases," the general model by Twelker et al., 1972, discussed earlier, provides a very appropriate framework for

Figure 13. SYSTEMS APPROACH MODEL FOR DESIGNING INSTRUCTION


Revising Instruction
Identifying Instructional Goal
Conducting Instructional Analysis
Identifying Entry Behaviors, Characteristics
Writing Performance Objectives
Developing Criterion-Referenced Tests
Developing Instructional Strategy
Developing and Selecting Instruction
Designing and Conducting Formative Evaluation
Designing and Conducting Summative Evaluation

SOURCE: W. Dick and L. Carey, The systematic design of instruction. Glenview, Illinois: Scott, Foresman & Co., 1978, p.6.

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identification of the larger "phases" of the Dick and Carey model. The three phases of the general model by Twelker et al. were: Problem Definition and Organization, System Analysis and Development, and System Evaluation. The "Problem Definition and Organization" phase would include the first two components of the Dick and Carey model; Identify Instructional Goal, and Conduct Instructional Analysis. The "System Analysis and Development" phase would include components 3 to 7: Identify Entry Behaviors, Characteristics; Write Performance Objectives; Develop Criterion-Referenced Tests; Develop Instructional Strategy; and Develop and Select Instruction. The final phase, "System Evaluation," would include the last two components of the Dick and Carey model: Design and Conduct Formative Evaluation, and Revise Instruction. Note that the general model by Twelker et al. treats revision as an ongoing process which may "feedback" (or feed forward) information among any of the three phases. Dick and Carey, however, depict the revision "feedback loop" as going back only to the component labelled "Conducting Instructional Analysis."

The model by Gagné and Briggs (1979) is presented in Table 11. Since no graphic representation of the model was provided, its stages are simply listed as presented by the authors. The model, while operational, has been extensively

Table 11. STAGES IN DESIGNING INSTRUCTIONAL SYSTEMS

System Level

1. Analysis of Needs, Goals, and Priorities
2. Analysis of Resources, Constraints, and Alternate Delivery Systems
3. Determination of Scope and Sequence of Curriculum and Courses; Delivery System Design

Course Level

4. Determining Course Structure and Sequence
5. Analysis of Course Objectives

Lesson Level

6. Definition of Performance Objectives
7. Preparing Lesson Plans (or Modules)
8. Developing, Selecting Materials, Media
9. Assessing Student Performance (Performance Measures)

System Level

10. Teacher Preparation
11. Formative Evaluation
12. Field Testing, Revision
13. Summative Evaluation
14. Installation and Diffusion

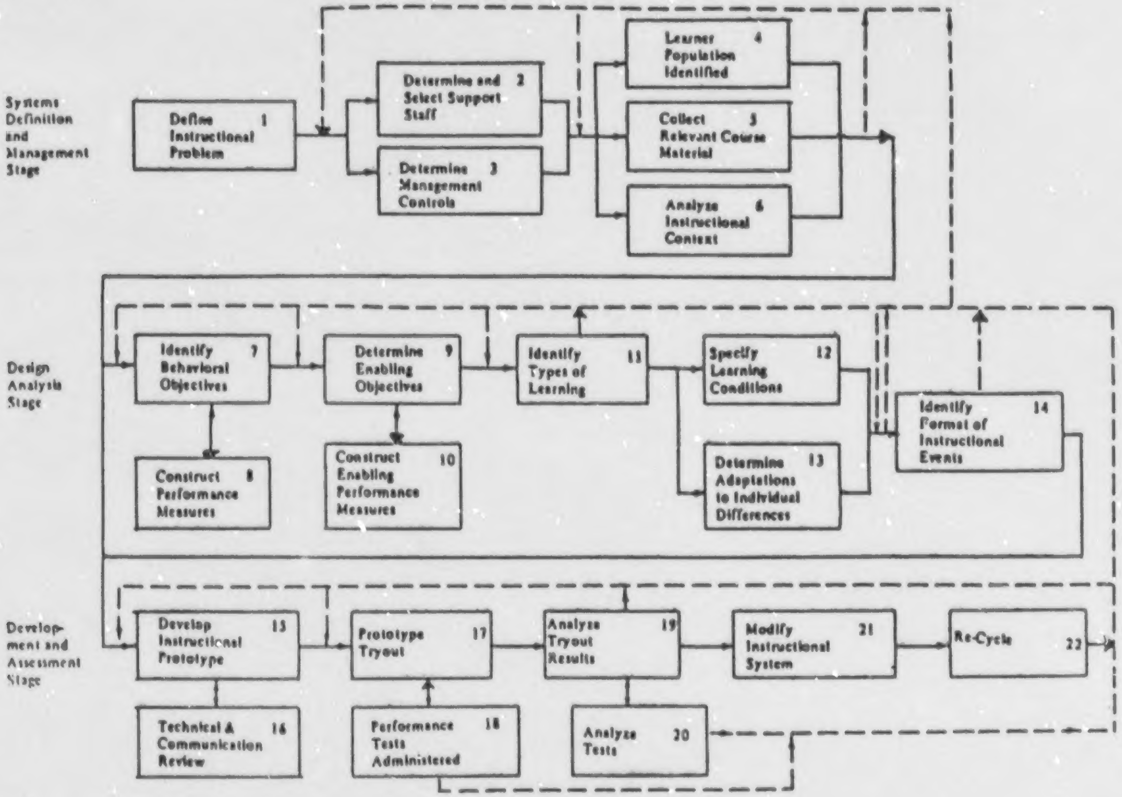
SOURCE: R.M. Gagnė and L.J. Briggs, Principles of instructional design (2nd edition). New York: Holt, Rinehart and Winston, 1979, p. 23.

used as a resource in the preparation of instructional design and development professionals (Durzo, Diamond and Doughty, 1979; Miller and Nauman, 1979). The four major phases of the model are divided according to the level at which steps in those phases are directed, rather than strictly by function. Since the reader need not interpret a figure to know which steps are included under each phase (level), the steps need not be listed here. It should be pointed out, however, that although a simple listing of steps might lead to the inference that the authors advocate a linear progression rather than a dynamic process, a brief review of Gagné and Briggs (1979) will assure the reader that such is not the case. The authors clearly point out:

> Although the stages are listed [in Table 11] as discrete steps shown in sequential, linear fashion, emphasis was placed on the interactive nature of the design process. This is to say in practice there is much working backwards and forward in a non-linear fashion, because work done at any one stage gives new insight into other stages (p. 40).

The Teaching Research Model (Hamreus, 1968) is illustrated in Figure 14. In addition to the previously stated reasons for including the Hamreus model, there are two other reasons for its inclusion (in spite of, or because of, its early vintage). First, the model has been widely used in both educational and training environments. This present writer has had occassion to use the Hamreus

Figure 14. A FLOW DIAGRAM SHOWING THE STEPS IN THE TEACHING RESEARCH MODEL


Systems Definition and Management Stage
Define Instructional Problem 1
Determine and Select Support Staff 2
Determine Management Controls 3
Learner Population Identified 4
Collect Relevant Course Material 5
Analyze Instructional Context 6
Design Analysis Stage
Identify Behavioral Objectives 7
Construct Performance Measures 8
Determine Enabling Objectives 9
Construct Enabling Performance Measures 10
Identify Types of Learning 11
Specify Learning Conditions 12
Determine Adaptations to Individual Differences 13
Identify Format of Instructional Events 14
Development and Assessment Stage
Develop Instructional Prototype 15
Technical & Communication Review 16
Prototype Tryout 17
Performance Tests Administered 18
Analyze Tryout Results 19
Analyze Tests 20
Modify Instructional System 21
Re-Cycle 22

SOURCE: P.A. Twelker, F.D. Urbach and J.E. Buck, The systematic development of instruction: an overview and basic guide to the literature. Stanford, California: Stanford University, ERIC Clearinghouse on Media and Technology, 1972, p. 3. (Reprinted from Hamreus, D.G., The Systems Approach to Instructional Development Monmouth, Oregon: Teaching Research, 1968)

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model in both environments. Second, the Hamreus model is considered (Gustafson, 1981) to be one of the "classics" (p. 5). Many future ID models were, in fact, extensions or modifications of the Hamreus model (e.g., Twelker, Urbach and Buck, 1972). The Hamreus model is also well-known for its "maxi" and "mini" versions. The former version is the operational model, while the latter provides instructional developers with "a simple model to communicate with clients" (Gustafson, 1981, p. 5). Figure 14 illustrates the three stages (phases) of the model: Systems Definition and Management, Design Analysis, and Development and Assessment. Since the steps in each stage are clearly numbered, they will not be listed here. The reader's attention is called to the elaborate network of "feedback loops" among the steps and the three stages, representing the author's conception of instructional development as a very dynamic process indeed.

Chapter II of this present study examined the literature relevant to the systemic (and systematic) development of instruction. Major current trends in instructional development and future issues in the field were discussed. The concepts of General Systems Theory were also presented and applications of the Theory, especially of open systems, were discussed. Discussion seemed to strongly support the conceptualization of instructional development as an open system. An examination of a representative sample of systems models of instructional development indicated that such a conceptualization is, indeed, warranted and currently operationalized.

The ID literature provides an extensive discussion of the current and desirable practices involved in the instructional development process. Such discussion may serve as a valuable reference for instructional developers interested in improving and maintaining their level of professional competence. Since this present study is concerned with the construction of an operational ID model, however, a more quantifiable assessment of current and desirable ID process behaviors is indicated.

Chapter III of this present study will delineate the methodology and research design employed in a nation-wide survey of ID process behaviors. The proposed operational model of instructional development will be constructed from a synthesis of the findings of the literature and the analysis and findings of the survey.

CHAPTER III

METHODOLOGY AND RESEARCH DESIGN

Chapter II examined the relevant literature of instructional development. This examination consisted of interrelated discussion of the following five issues:

1. the attempt to define and unite the instructional development profession and its practices,
2. current trends in instructional development,
3. major issues in the future of instructional development,
4. the application of General Systems Theory (especially the concept of open systems) to instructional development, and
5. a brief review of selected instructional development models which are based on the systems approach.

As stated in Chapter I, the central questions to be addressed in this present study are:

1. To what extent does the process of instructional development (ID) differ in its actual practice in higher education from its actual practice in business/industry?

2. To what extent do ID professionals in higher education differ from those in business/industry regarding the instructional development process as it "should be" practiced under "ideal circumstances"?

3. What significant differences, if any, exist between the instructional development process as it is now practiced and as it "should be" practiced

under "ideal circumstances" by ID professionals in higher education and in business/industry?

This chapter will delineate the methodology and research design employed in this present study. The research design addresses the following: the process of constructing, developing and pilot testing the instrument (survey), the sampling procedures and administration of the instrument, and the methodology and statistical procedures to be employed in the analysis of the resultant data.

Measurement Instrument (Survey) Development

The pilot survey instrument was developed as a result of an extensive examination of existing models of instructional design/development, as well as relevant literature dealing with the instructional development process. From this examination, a series of items were constructed concerning specific behaviors conducted in the ID process. The general model of instructional development proposed by Durzo, Diamond and Doughty (1979) was used as a conceptual framework to categorize the specific items into three major "phases": Define, Develop and Evaluate. Behaviors which involved the revision of instruction were categorized under the last phase (i.e., Evaluate). The pilot survey underwent three complete revisions before being mailed out (the 4th version). During the revision process colleagues of the present writer assisted in refining the items. Thus, the content validity of the pilot survey was established through the examination of the relevant ID literature related to the instructional development process, and through the revisions made as a result of input from colleagues in the ID profession. This is a highly-supported technique for establishing content validity (Tuckman, 1975, pp. 247). Reliability of the instrument was also a key consideration, and will be specifically addressed in the next section. Responses from the pilot survey let to further revision of the instrument. These revisions were based on an item-analysis focusing primarily on inter-item correlation, and on comments, questions and suggestions provided by the respondents. This feedback was requested in the pilot survey cover letter.

The final survey instrument was then constructed based on the preceding actions. The survey consists of two major sections. In Section A, respondents are asked "to indicate the extent to which certain instructional development (ID) behaviors are practiced in your organization AND to indicate the extent to which you believe these behaviors should be practiced under 'ideal circumstances'." Section A contains 26 of these items.

Since respondents are asked to respond in terms of both "actual" and "ideal" circumstances, a total of 52 responses is required for Section A. Responses are given in terms of percentages, using the following five-point scale:

0 = the behavior is never practiced
25 = the behavior is practiced about 25% of the time
50 = the behavior is practiced about 50% of the time
75 = the behavior is practiced about 75% of the time
100 = the behavior is always practiced

The respondents are instructed, "If your response would fall between two percentages, please choose the response which you believe would most closely represent your desired response. CIRCLE your response."

Table 12 lists the 26 items (in abbreviated form), the phase of the ID process under which that particular behavior may be categorized (according to the previously discussed model by Durzo, Diamond and Doughty, 1979), and which of the six selected models in the previous chapter (if any) explicitly advocate the behavior. Please note that four of the behaviors (marked with asterisks) were included as "experimental items" by the present author to determine the presence (or absence) of behaviors (i.e., tasks) not usually explicitly stated in instructional development models. Item 2 attempts to ascertain the necessity of "updating" ID personnel on a project's progress and may be an indication of the degree of

Table 12. SURVEY ITEMS: CLASSIFIED BY ID PHASE AND ID MODEL

Item #	Description	ID Phase	ID MODELS (from Chapter II) advocating behavior
1	Assess constraints	Define	All six
* 2	Update personnel	Develop	Branson, Kemp
* 3	Inform organization	Define	None
4	Needs analyzed	Define	All six
* 5	Client outline	Define	Diamond
6	Entry behaviors	Define	Branson, Diamond, Gagné and Briggs, Hamreus, Kemp
7	Select personnel	Develop	Dick and Carey, Gagné and Briggs, Hamreus, Kemp
8	Establish scope	Define	All six
9	Select media	Develop	All six
10	Select materials	Define	All six
11	Differentiate needs	Define	Gagné and Briggs, Diamond
*12	Site visitation	Develop	Branson, Diamond
13	Behavioral Objectives	Develop	All six
14	Learning Taxonomy	Develop	Gagné and Briggs, Hamreus, Kemp
15	Remedial instruction	Develop	Branson, Diamond, Dick and Carey, Gagné and Briggs
16	Test learners	Evaluate/ Revise	All six
17	Individual Differences	Develop	All six
18	Formative evaluation	Develop	All six
19	Summative evaluation	Develop	All six
20	Modify instruction	Evaluate/ Revise	All six
21	Criterion evaluation	Evaluate/ Revise	All six
22	Learner feedback	Evaluate/ Revise	All six
23	Tests related to objectives	Develop	All six
24	Environment(s) selected based on objectives	Develop	Branson, Diamond, Gagné and Briggs, Hamreus
25	Staff/mgt. controls	Develop	Branson, Diamond, Hamreus
26	Train instructors	Develop	Branson, Diamond, Gagné and Briggs, Kemp

* Experimental items (Please see discussion in this chapter.)

attention to one of the aspects of a systems approach -- effective communication among members of an instructional development team. Item 3 attempts to ascertain the degree to which the respondent is able to adopt a "proactive" stance regarding instructional needs in an organization. Traditionally, the role of the instructional developer (or ID agency) has been more "reactive," serving primarily as a support resource for already established organizational goals and priorities. Item 5 is similar to item 2, except that here the issue at stake is effective communication with the ID client. Such effective communication at an early state in the process can help to clarify goals, establish expectations, eliminate time wasted in developing unwanted or unneeded instruction, and help to establish rapport between client and developer. Item 12 is a behavior often advocated by developers and welcomed by clients. However, field site visitations are often prohibited because of time, budget and staff constraints. This behavior is, however, seldom explicitly advocated in instructional development models.

The only item in Section A which stated a behavior not explicitly advocated by any of the six selected models was item 3 which was, as was previously stated, an "experimental" item which attempts to take one possible measure of the degree of proactivity of the respondent and/or the respondent's ID agency.

It is worth noting, insofar as the content validity of the items are concerned, that 50% (11 our of 22) of the non-experimental item behaviors were explicitly advocated in all six of the selected models, while 100% (26 out of 26) of the non-experimental item behaviors were explicitly advocated in two or more of the selected models. Since the selected models are representative of the systems approach ID models now in use (as discussed in Chapter II of this study), the content validity of the survey items seems to be fairly well established.

Section B of the survey contains six demographic items focusing on the type of organization in which the respondents work, the length of time they have been actively working in the development of instruction, the highest level of formal education attained thus far, the number of professional organizations (related to ID) in which they currently hold membership, how long they plan to stay in the field of ID, and a final administrative item asking if they wish to receive the results of the survey.

Pilot Testing of the Instrument

The pilot test of the proposed instrument (survey) was developed over a period of approximately seven months (mid-September 1981 through mid-March 1982). The instrument underwent three revisions. The fourth (and last) version was mailed on March 16, 1981 to 50 respondents, all members of the group of 826 candidate respondents identified for participation in this study. The sampling procedure used in this study is discussed in the next section of this chapter. It should be noted that none of the 50 participants in the pilot test were used as participants in the final survey -- whether or not they actually responded to the pilot survey. Of the 50 pilot surveys mailed out, 2 were returned but unused because the respondent did not feel qualified to respond to the items, one survey was returned because the addressee was no longer employed in that organization, and 3 surveys were returned too late to be included in the results. Therefore, six responses were not used, resulting in a net response rate of 54.5% (24 out of 44), taking into consideration the responses received but not used. Of the 24 completed surveys used, 29% were business respondents (7 out of 24) and 71% were education respondents (17 out of 24).

An item analysis of the completed pilot surveys, focusing on inter-item correlations, was conducted. In addition, respondents were asked to write any questions, comments, criticisms or suggestions for improving the instrument -- or for revising any particular item. As a result of this input, minor revisions were made in the wording of four items.

Reliability measures for both the "actual" and "ideal" scales were very satisfactory. The coefficient alpha reliability level for the "actual" scale (26 items) was .88979; that for the "ideal" scale (26 items) was an even higher .91651. Therefore, the minor revisions were deemed sufficient to prepare for the construction and implementation of the final survey.

Sampling Procedures

A current, comprehensive list of instructional designers/developers could not be found (and probably does not exist). Therefore, selection of the sample was conducted by obtaining mailing labels from two professional organizations most likely to attract instructional development professionals to their membership. The two selected organizations were the Association for Educational Communications and Technology's Division of Instructional Development (AECT/DID) and the American Society for Training and Development's (ASTD), Educational Institutions Special Interest Group and ASTD's Career Development Division. This method of selection was supported by Razik (1981) and Heinich (1982).

Both organizations provided nation-wide lists of respondent candidates from both educational and non-educational (e.g., business, industry, government, and military) institutions and organizations. The lists provided included active members of the respective organizations as of February 20, 1982. A total of 5,780 names (and mailing labels) were received from both organizations. The AECT/DID labels were provided without any charge. However, a formal authorization process had to be followed in order to obtain permission from ASTD to survey its membership (including a letter to the Chief Executive Officer explaining the purposes of the survey and its uses, and a copy of the pilot survey instrument).

Respondent candidates were selected from the provided lists based on either job title (e.g., instructional designer, instructional developer, educational consultant) or, in cases where a title was not given, by reputation as an ID professional (if such reputation was known by the present writer). Only candidates from higher education and business/industry were considered.

A nation-wide list of 826 respondent candidates was thus obtained. Approximately two-thirds of the candidates were from business/industry and one-third from higher education. The exact numbers involved were not possible to determine at that time due to a number of respondents without titles and using home addresses. However, these represented a very small percentage of the 826 respondent candidates (under 3%) and was not considered significant enough to impact the decision to use a 2 to 1 ratio for the sampling. From the total of 826 respondent candidates, 50 were randomly selected for participation in the pilot test of the survey, leaving 776 respondent candidates for the final survey. It was decided to delete 26 names from the list of respondent candidates for whom no title or work address was provided. This was done to reduce the possible impact of unspecified work environments on the established sampling ratio of one-third education and two-thirds business (and industry). This resulted in a sample of 750 for the final survey: 250 respondents in education (1/3) and 500 respondents in business (2/3).

Limitation of the sample to members of the two professional organizations (AECT and ASTD) could potentially influence (bias) the sample results inasmuch as members of these organizations might tend to be more knowledgeable about current concepts and practices of instructional development through familiarization with the journals and other publications of these organizations, and through participation in sponsored activities related to instructional development. However, in addition to the support received by the present author concerning the use of these organizations to obtain a sample (Heinich, 1982; Razik, 1981), there is also the fact that the number of appropriate respondents who do not belong to either of these organizations (AECT or ASTD) is unknown.

The pilot test instrument (survey) was mailed to 50 respondents on March 16, 1982. For purposes of the pilot survey, an equal mix of education and business respondents was used (25 each). A cover letter requested return of the completed survey on or before March 31, 1982. A self-addressed, stamped return envelope was enclosed in each mailing to encourage as high a response rate as possible. The procedures used in the pilot test and the actions taken based on its resultant data will be detailed in the section of this chapter concerned with the pilot test of the survey.

The initial mailing to all 750 respondents was sent out on April 10, 1982. A return date of April 23, 1982 was requested. A copy of the survey and a self-addressed, stamped return envelope were enclosed. The cover letter is included in Appendix C.

The first follow-up mailing was sent out on May 3, 1982 to the 455 respondents whose surveys had not yet been received. A return date of May 14, 1982 was requested. A second copy of the survey; a self-addressed, stamped return envelope; and another copy of the original cover letter were enclosed. The cover letter for this mailing is included in Appendix C.

The second follow-up mailing was sent out on May 22, 1982 to the 364 respondents whose surveys had still not been received. Respondents were asked either to return the completed survey or to indicate their status (unwilling to respond, already responded, lost survey, etc.). The name of each respondent was handwritten by this writer on each letter (also in Appendix C).

A third follow-up was sent to 26 individuals who had indicated in their response to the previous letter (follow-up letter of May 22, 1982) that they were willing to respond to the survey, but that they needed another copy of the survey (for whatever reason). This third follow-up mailing began on May 29, 1982. The last survey was mailed out on June 8, 1982. A deadline of June 18, 1982 was established. Any surveys which were received after that date were not included in the total number of completed returns.

Statistical Methodology

Four statistical analyses will be performed on the survey instrument data. First, a descriptive listing of the demographic items (27-32) will be performed. The Condescriptive program of the Statistical Package for the

Social Sciences (SPSS) by Nie, Hull, Jenkins, Steinbrenner and Bent (1975) will be employed. This program provides listings of frequencies, means, and standard deviations of the input data.

Second, a descriptive listing of the items concerning behaviors in the instructional development process will be performed using the program cited above (Nie et al., 1975). Since the respondent sample was sub-divided into two major categories (Business and Education) and since each of the ID behavior items (1-26) requested responses in terms of both "actual" practice of behavior and practice of those behaviors under "ideal" circumstances, this descriptive listing will be performed in six parts, as follows:

1. Business responses: Actual
2. Business responses: Ideal
3. Education responses: Actual
4. Education responses: Ideal
5. Total (Business plus Education) responses: Actual
6. Total (Business plus Education) responses: Ideal

Third, differences between related group means will be calculated for the input data. Five comparisons will be made and z values calculated to determine the presence or absence of significant differences between the mean responses in each comparison. Calculation of z values follow the procedure described by Chase (1976). The five comparisons to be made are as follows:

1. Business responses: Actual vs. Ideal
2. Education responses: Actual vs. Ideal
3. Actual responses: Business vs. Education
4. Ideal responses: Business vs. Education
5. Total (Business plus Education) responses: Actual vs. Ideal

The aim of the first comparison (Business responses: Actual vs. Ideal) is to determine which of the instructional development behaviors (if any) the business respondents feel should be practiced significantly more often than they are currently being practiced. The second comparison seeks to make the same determination for education respondents. The aim of the third comparison (Actual responses: Busines vs. Education) is to determine which instructional development behaviors (if any) are practiced significantly more often by either business or education respondents. The fourth comparison (Ideal responses: Business vs. Education) is to determine whether or not any significant differences are present with regard to business and education respondents' perceptions of how often each of the instructional development process behaviors should be practiced. The fifth comparison (Total responses: Actual vs. Ideal) is to determine whether or not all respondents, considered as a total response group, identified any instructional development behaviors that should be practiced significantly more often than they are now practiced.

The fourth statistical analysis will consist of the calculation of the correlation coefficients among all survey items.

This present chapter has sought to delineate the methodology and research design treatments for the measurement instrument (survey). The research design consisted of the following:

1. identification of the sampling and administration procedures of the instrument,
2. description of the process of constructing and developing the instrument,
3. description of the pilot test of the instrument, and
4. identification of the methodology and statistical procedures to be employed in the analysis of the resultant data.

Chapter IV will summarize the analysis and findings of the data.

CHAPTER IV

FINDINGS AND ANALYSIS

The preceeding chapter delineated the methodology and research design of the measurement instrument (survey). This present chapter discusses the findings of the data and focuses on the four statistical analyses which were performed. First, the descriptive statistics of the total sample of respondents (instructional development professionals from business and higher education) is presented. Second, a descriptive listing of the instructional development process behavior items (1-26) is presented. Third, the differences between related mean responses on ID items (1-26)is examined. Fourth, a correlational analysis for all survey items is conducted.

As stated in Chapter I, the central questions to be addressed in the present study are:

1. To what extent does the process of instructional development (ID) differ in its actual practice in higher education from its actual practice in business/ industry?
2. To what extent do ID professionals in higher education differ from those in business/industry regarding the instructional development process as it "should be" practiced under "ideal circumstances"?
3. What significant differences, if any, exist

between the instructional development process as it is now practiced and as it "should be" practiced under "ideal circumstances" by ID professionals in higher education and in business/industry?

Descriptive Statistics of the Sample

A total 750 surveys were sent out. Of these, 566 respondents replied with either usable or unusable responses, resulting in a gross reply of 75.7 percent. Of the 566 returns, 155 were unusable. The major reasons given by respondents (or persons replying for the respondent) were:

1. inability to respond to the ID items (1-26) due to nature of respondent's job;
2. inability to respond to the ID items (1-26) due to nature of the respondent's employing organization;
3. inability to respond to the ID items (1-26) due to lack of sufficient knowledge of respondent regarding instructional development;
4. addressee had left position -- no forwarding address given; or
5. survey was completed, but respondent warned that his/her responses might be inappropriate for some reason. (These reasons were not used.)

Of the 750 surveys mailed, then, 155 were discarded, leaving a maximum of 595 appropriate respondents. Of these 595, a total of 411 usable surveys were received. This represents a net response rate of 69 percent.

Table 13 provides a breakdown of these reponses by mailing and by sub-sample (Business and Education). Table

Table 13. SURVEY RESPONSES BY MAILING AND SUB-SAMPLE GROUP

Mailing	RESPONSES					
	Business		Education		Combined	
	Usable	Unusable	Usable	Unusable	Usable	Unusable
1st Mailing April 10, 1982 750 mailed	164	11	108	19	272	30
1st Follow-up May 3, 1982 455 mailed	69	10	19	7	88	17
2nd Follow-up May 22, 1982 364 mailed	23	66	17	23	40	69
3rd Follow-up May 29, 1982 through June 8, 1982 26 mailed*	6	18	5	1	11	19
TOTAL	262	105	149	50	411	155

* Although only 26 surveys were mailed out in the final follow-up, 30 responses were received. Several of these responses were, then, as a result of previous mailings.

14 provides a breakdown of the 411 completed surveys by originating state or U.S. territory, illustrating the results of the nation-wide sampling procedure discussed in the previous chapter.

The complete descriptive statistics for the survey demographic items (27-32) are tabulated in Table 15-20.

Table 15 shows that the largest number of respondents (207 out of 411) were employed by business or industrial organizations. This represents just over one-half (50.4%) of the total number of respondents. Respondents from higher education represented 36.3% (149 out of 411) of the total number of respondents. The third response group, those who checked the "other" category, was made up of those instructional development professionals engaged in private consulting or employed by privately-owned consulting organizations. This group comprised 13.3% (55 out of 411) of the total number of respondents.

Table 16 shows that almost two-thirds of the respondents (64%) indicated that they had six or more years experience in instructional development. The education respondents seem to be more experienced as a group than the business respondents, since 71.8% of the education respondents claimed to have six or more years of ID experience, while 59.5% of the business respondents

Table 14. RESPONSES BY STATE OR U.S. TERRITORY

Alabama	3	New Hampshire	3
Alaska	0	New Jersey	14
Arizona	10	New Mexico	4
Arkansas	2	New York	37
California	35	North Carolina	6
Colorado	4	North Dakota	0
Connecticut	6	Ohio	11
Delaware	3	Oklahoma	3
Florida	15	Oregon	2
Georgia	10	Pennsylvania	14
Hawaii	4	Rhode Island	2
Idaho	0	South Carolina	3
Illinois	28	South Dakota	0
Indiana	11	Tennessee	4
Iowa	1	Texas	24
Kansas	4	Utah	9
Kentucky	4	Vermont	0
Louisiana	4	Virginia	17
Maine	1	Washington	7
Maryland	9	West Virginia	2
Massachusetts	34	Wisconsin	12
Michigan	10	Wyoming	1
Minnesota	11		
Mississippi	2	District of Columbia	7
Missouri	8	Guam	1
Montana	1	Puerto Rico	2
Nebraska	4		
Nevada	2	TOTAL.......	411

Table 15. EMPLOYING ORGANIZATION (item 27)

	Business		Education		Combined	
Responses	Freq.	%	Freq.	%	Freq.	%
1. College, University or other educational institution	2	.8	147	98.7	149	36.3
2. Business or Industrial org.	206	78.6	1	.7	207	50.4
3. Military	0	0	0	0	0	0
4. Government	0	0	0	0	0	0
5. Other*	54	20.6	1	.7	55	13.3
	262	100.0	149	100.0	411	100.0
Mean	2.611		1.034		2.039	
Standard Deviation	1.223		.337		1.253	

* Includes private consulting. Also, some respondents interpret their role in an instructional development agency as apart from the identified nature of the employing organization.

Table 16. TIME SPENT WORKING IN INSTRUCTIONAL DEVELOPMENT (item 28)

	Business		Education		Combined	
Responses	Freq.	%	Freq.	%	Freq.	%
1. less than 1 year	10	3.8	1	.7	11	2.7
2. 1-2 years	28	10.7	7	4.7	35	8.5
3. 3-5 years	67	25.6	34	22.8	101	24.6
4. 6-10 years	71	27.1	38	25.5	109	26.5
5. more than 10 years	85	32.4	69	46.3	154	37.5
blank	1	.4	0	0	1	.2
	262	100.0	149	100.0	411	100.0
Mean	3.748		4.121		3.883	
Standard Deviation	1.144		.965		1.096	

Table 17. HIGHEST LEVEL OF FORMAL EDUCATION (item 29)

	Business		Education		Combined	
Responses	Freq.	%	Freq.	%	Freq.	%
1. pre-college level	10	3.8	0	0	10	2.4
2. baccalaureate degree	74	28.2	7	4.7	81	19.7
3. master's degree	122	46.6	44	29.5	166	40.4
4. doctorate	41	15.6	65	43.6	106	25.8
5. post-doctorate studies	15	5.7	33	22.1	48	11.7
	262	100.0	149	100.0	411	100.0
Mean	2.912		3.832		3.246	
Standard Deviation	.903		.825		.981	

Table 18. ID ORGANIZATIONAL MEMBERSHIPS HELD (item 30)

	Business		Education		Combined	
Responses	Freq.	%	Freq.	%	Freq.	%
1. none	23	8.8	9	6.0	32	7.8
2. one	90	34.4	33	22.1	123	29.9
3. two	88	33.6	38	25.5	126	30.7
4. three	31	11.8	33	22.1	64	15.6
5. more than three	30	11.5	36	24.2	66	16.1
	262	100.0	149	100.0	411	100.0
Mean	2.828		3.362		3.022	
Standard Deviation	1.116		1.237		1.188	

Table 19. FUTURE CAREER PROSPECTS IN ID (item 31)

	Business		Education		Combined	
Responses	Freq.	%	Freq.	%	Freq.	%
1. less than 1 year	9	3.4	3	2.0	12	2.9
2. 1-3 years	36	13.4	12	8.1	48	11.7
3. 4-6 years	32	12.2	13	8.7	45	10.9
4. at least 7 years but not necessarily for the balance of my career	49	18.7	34	22.8	83	20.2
5. for the balance of my career	85	32.4	46	30.9	131	31.9
6. undecided	50	19.1	41	27.5	91	22.1
blank	1	.4	0	0	1	.2
	262	100.0	149	100.0	411	100.0
Mean	4.218		4.550		4.338	
Standard Deviation	1.437		1.307		1.399	

Table 20. WISH TO RECEIVE RESULTS OF SURVEY (item 32)

	Business		Education		Combined	
Responses	Freq.	%	Freq.	%	Freq.	%
1. Yes	241	92.0	131	87.9	373	90.5
2. No	21	8.0	18	12.1	39	9.5
	262	100.0	149	100.0	411	100.0
Mean	1.080		1.121		1.095	
Standard Deviation	.272		.327		.293	

claimed the same level of experience.

In terms of the formal education level of the respondents, Table 17 shows that the largest category was comprised of respondents holding master's degrees (166 out of 411, or 40.4%). However, a marked difference is apparent between business and education respondents. The largest category for business respondents was for those holding master's degrees. This category represented 46.6% (122 out of 262) of business respondents. The second largest category for business respondents was for those holding only a baccalaureate degree. This category represented 28.2% (74 out of 262) of business respondents. In contrast, the largest response category for education respondents was for those holding a doctoral degree. This category represented 43.6% (65 out of 149) of education respondents. The second largest response category for education respondents was for those holding a master's degree. This category represented 29.5% (44 out of 149) of education respondents. Also, while only 5.7% (15 out of 262) of business respondents indicated that they had taken "post-doctorate studies," 22.1% (33 out of 149) of education respondents indicated that they had done so. This marked difference in levels of formal education between business and education respondents should not be surprising. Whereas a master's degree is sometimes acceptable for instructional development professionals who practice in higher education, a doctorate is preferred and often required. In contrast, the emphasis in business organizations is most often more on the amount of actual experience the instructional developer possesses. Advanced degrees are seldom required, although that situation is changing - especially in these times of high unemployment, staff reductions, and demands for increased productivity. Also, the level of formal education of top management in business organizations is rising for the same reasons. As a result, many business organizations actively support continuing education of current employees and more stringent entry requirements for new employees.

As shown in Table 18, education respondents indicated slightly more involvement than did business respondents insofar as membership in ID-related organizations. Business respondents averaged just under two memberships, while education respondents averaged slightly over two memberships. The largest overall response category (for business and education respondents combined) was membership in two organizations related to instructional development. This response category comprised 30.7% (126 out of 411) of all respondents. Membership in only one organization was the second largest response category, representing 29.9% (123 out of 411) of all respondents.

Only 23.3% (61 out of 262) of business respondents belonged to three or more ID-related organizations. However 46.3% (69 out of 149) of education respondents belonged to three or more of these organizations.

Table 19 shows that when they were asked to indicate how long they planned "to stay in the field of ID (given the choice)," most respondents projected a long-term commitment to the field, 52.1% (214 out of 411) indicating that they planned to work in the instructional development field for seven or more years. Business and education respondents both indicated similar degrees of commitment, 53.7% (80 out of 149) of education respondents projecting seven or more years of involvement in ID, and 51.1% (134 out of 262) of business respondents projecting this level of commitment.

Item 32 (an administrative item) asked whether or not the respondent wished to receive the results (group data) of the survey. Table 20 shows that the overwhelming response was positive, 90.5% (373 out of 411) of respondents indicating that they did wish to receive the results. Business respondents held a slight edge: 92% (241 out of 262) requested the results, compared to 87.9% (131 out of 149) of education respondents.

Thus far, this chapter has examined the descriptive statistics for the sample response rates and the descriptive statistics for the survey demographic items (27-32). The descriptive statistics of the survey instructional development behavior items (1-26) will now be examined.

Descriptive Statistics of ID Behavior Items

This section focuses upon those ID behavior items that elicited mean responses of less than 50%, since a more detailed analysis of all ID items will be discussed later in this chapter. This section discusses these ID items (with less than a 50% mean response) in the following order:

1. Business responses on the "actual" scale
2. Business responses on the "ideal" scale
3. Education responses on the "actual" scale
4. Education responses on the "ideal" scale
5. Combined (business and education) responses on the "actual" scale
6. Combined (business and education) responses on the "ideal" scale

Business-Actual

As illustrated in Table 21, business respondents indicated that only three of the 26 instructional development behaviors (i.e., items 14,15, and 25) were practiced less than 50% of the time.

Item 14 elicited a mean response of 33.575%. This

Table 21. BUSINESS ID ITEM RESPONSES

"ACTUAL"

ITEM	$\bar{X}$	s^2	N
1 Assess constraints	65.840	763.468	262
2 Update personnel	75.872	638.828	258
3 Inform organization	56.807	741.350	259
4 Needs analyzed	53.916	843.372	262
5 Client outline	60.655	957.734	261
6 Entry behavior	50.775	978.206	262
7 Select personnel	63.558	1212.680	260
8 Establish scope	71.865	646.533	262
9 Select media	80.821	624.516	262
10 Select materials	77.692	692.530	260
11 Differentiate needs	56.775	709.655	261
12 Site visitation	65.840	1242.396	262
13 Behavioral objectives	72.901	723.546	262
*14 Learning taxonomy	33.575	919.822	261
*15 Remedial instruction	43.702	1258.080	262
16 Test learners	58.241	988.599	261
17 Indiv. differences	51.870	859.899	262
18 Formative evaluation	60.973	911.214	262
19 Summative evaluation	72.569	717.894	262
20 Modify instruction	79.119	470.951	261
21 Criterion evaluation	56.920	915.223	262
22 Learner feedback	82.042	607.117	261
23 Tests based on obj.	67.080	1098.434	262
24 Envir. based on obj.	60.911	867.841	259
*25 Staff/Mgt. controls	35.641	1079.411	262
26 Train instructors	75.336	774.002	262

* elicited mean response of less than 50% of time practiced.

$\bar{x}$ = mean response to item (in terms of percentag of time practiced)
s^2 = variance
N = number of responses to item

item pertains to the use of a specified taxonomy to analyze the types of learning required in the instruction. The low mean response may be attributable to the lower level of formal education attained by business respondents, since use of these taxonomies is most often learned in graduate-level courses. Another factor which could contribute to this low mean response is the lack of sophistication of ID clients in business settings regarding learning taxonomies. Such clients may view their use as unnecessarily time consuming.

Item 15, which elicited a mean response of only 43.702% from business respondents, refers to the availability of remedial instruction. Two factors may contribute to this low percentage. First, the evaluation of students (trainees) in business is not always used as a basis of making decisions about trainees due to fear of conflict with Equal Employment Opportunity (EEO) guidelines, lack of management support for training, poorly structured and/or unvalidated evaluation instruments, or a complete absence of any trainee evaluation whatsoever. Second, most training units or departments in business organizations simply do not have the staff to provide the additional time needed to offer remedial help. Instead, a trainee who does not reach an "acceptable level" of performance on a test is simply re-cycled through the same instruction. In other cases, nothing is done.

Item 25 pertains to the use of some specified technique for establishing staff and management controls for the ID process. Business respondents indicated that they practice this behavior only 35.641% of the time. It may be that the respondents are unfamiliar with the possible techniques (e.g., PERT, PPBS, flow charting, decision tables, etc.) It may also be that staff and management controls are more informally established, or are established through organization-specific norms, practices or procedures which are not associated with the specific techniques mentioned above.

Business-Ideal

As indicated in Table 22, business respondents did not indicate that any of the 26 instructional development behaviors should be practiced less than 50% of the time under "ideal" circumstances.

Education-Actual

According to Table 23, education respondents indicated

Table 22. BUSINESS ID ITEM RESPONSES

"IDEAL"

ITEM	$\bar{X}$	s^2	N
1 Assess constraints	89.272	398.891	261
2 Update personnel	95.349	167.971	258
3 Inform organization	59.668	776.262	256
4 Needs analyzed	87.931	377.818	261
5 Client outline	87.692	431.913	260
6 Entry behavior	88.365	363.630	260
7 Select personnel	82.558	458.216	258
8 Establish scope	91.475	246.758	261
9 Select media	94.540	184.019	261
10 Select materials	90.481	331.332	260
11 Differentiate needs	86.969	481.185	259
12 Site visitation	84.291	598.438	261
13 Behavioral objectives	91.731	240.236	260
14 Learning taxonomy	67.063	882.976	252
15 Remedial instruction	77.115	801.492	260
16 Test learners	88.123	382.423	261
17 Indiv. differences	83.000	443.615	261
18 Formative evaluation	86.097	416.921	258
19 Summative evaluation	95.481	141.177	260
20 Modify instruction	96.889	94.107	261
21 Criterion evaluation	85.562	459.508	258
22 Learner feedback	95.119	186.228	261
23 Tests based on obj.	92.308	273.612	260
24 Envir. based on obj.	89.473	323.578	260
25 Staff/Mgt. controls	72.123	790.993	252
26 Train instructors	96.236	162.615	259

$\bar{x}$ = mean response to item (in terms of percentage of time practiced)
s^2 = variance
N = number of responses to item

Table 23. EDUCATION ID ITEM RESPONSES
"ACTUAL"

ITEM	$\bar{X}$	s^2	N
1 Assess constraints	64.796	717.081	147
2 Update personnel	73.459	812.264	146
3 Inform organization	45.862	824.773	145
4 Needs analyzed	57.993	830.363	147
5 Client outline	71.062	971.451	146
6 Entry behavior	51.871	899.730	147
7 Select personnel	56.253	1254.549	146
8 Establish scope	71.939	743.989	147
9 Select media	78.231	593.083	147
10 Select materials	74.315	611.597	146
11 Differentiate needs	56.891	766.700	147
12 Site visitation	62.163	1110.932	147
13 Behavioral objectives	67.295	875.561	146
14 Learning taxonomy	44.565	1021.371	147
15 Remedial instruction	47.211	893.537	147
16 Test learners	74.252	724.436	147
17 Indiv. differences	47.980	637.458	147
18 Formative evaluation	61.231	907.330	147
19 Summative evaluation	70.170	778.567	147
20 Modify instruction	70.238	610.731	147
21 Criterion evaluation	63.946	831.586	147
22 Learner feedback	73.388	670.458	147
23 Tests based on obj.	67.095	790.128	147
24 Envir. based on obj.	48.973	895.489	146
25 Staff/Mgt. controls	38.800	960.758	145
26 Train instructors	54.110	1129.547	146

$\bar{x}$ = mean response to item (in terms of percentage of time practiced)
s^2 = variance
N = number of responses to item

that six of the 26 instructional development behaviors were practiced less than 50% of the time. These behaviors were represented by items 3,14,15,17,24 and 25.

Item 3 (an "experimental item") may be viewed as one measure of the proactivity and autonomy of the respondent-or the ID agency of which he/she is a member. Education respondents indicated that they made others in their respective organization aware of instructional needs only 45.862% of the time. One possible reason for this low percentage may be that the instructional developer (or ID agency) in institutions of higher education does, in fact, operate in a predominatly reactive mode, responding to specific requests from individual faculty members or departments.

Item 14 (the use of learning taxonomies) is only practiced 44.565% of the time. While this mean response is significantly greater than that for business respondents, it may be hypothesized that such practice is generally not regarded as essential to the ID process. Another possibility is that, since the use of such taxonomies is one of the more difficult "steps" in the ID process, it is often purposely avoided; or, possibly, educators think this is an elementary step which is not needed.

Item 15 (providing remedial instruction) elicited a mean response of only 47.211%. A possible explanation might be the fixed-time nature of instruction in education. Courses are usually only one semester in duration. Students must, therefore, achieve whatever level of proficiency they can within that specified time frame. Such time constraints do not rapidly lend themselves to a "mastery"approach, of which remedial instruction is an integral part.

Item 17 (providing for individual differences) is only practiced 47.98% [illegible] be posed here as was [illegible] who have high "clas [illegible] the additional time [illegible] tion for individual [illegible] the availability of [illegible]

Item 24 refers to the selection of instructional environments "based on suitability for achieving the objectives of the instruction." The low percentage of time in which this behavior is practiced (48.973%) could be attributable to an assumption on the instructional developer's part (and that of faculty) that most instruction will take place in a classroom. Laboratories, field studies and other exceptions do not make up the majority of course environments.

Item 25 (the use of some specified technique for establishing staff and management controls for the ID process) is only practiced 38.8% of the time by education respondents. This behavior may be deemed unnecessary by some developers who are engaged primarily in small-scale ID projects. It might also be deemed unnecessary in a situation where a project is conducted by an individual instructional developer (as opposed to the ID team approach), or where an ID team has worked together on enough projects that a formalized staff and management control technique is viewed as superfluous.

[illegible]

not [illegible] behaviors should be practiced less than 50% of the time under "ideal circumstances." This is shown in Table 24.

Combination of Business and Education - Actual

Table 25 shows that, as a total group (combined business and education), respondents identifed only three

Table 24. EDUCATION ID ITEM RESPONSES "IDEAL"

ITEM	$\bar{X}$	s^2	N
1 Assess constraints	88.423	367.597	149
2 Update personnel	94.595	166.161	148
3 Inform organization	55.442	774.974	147
4 Needs analyzed	89.597	304.904	149
5 Client outline	93.162	302.545	148
6 Entry behavior	90.940	212.963	149
7 Select personnel	76.531	669.730	147
8 Establish scope	92.061	229.908	148
9 Select media	94.550	216.006	149
10 [illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
19 Summative evaluation	96.477	101.521	149
20 Modify instruction	94.463	133.831	149
21 Criterion evaluation	89.517	274.454	149
22 Learner feedback	94.966	168.749	149
23 Tests based on obj.	95.134	157.752	149
24 Envir. based on obj.	89.358	340.912	148
25 Staff/Mgt. controls	75.959	520.738	147
26 Train instructors	90.034	329.421	148

$\bar{x}$ = mean response to item (in terms of percentage of time practiced)
s^2 = variance
N = number of responses to item

Table 25. COMBINED (Bus. and Ed.) ID ITEM RESPONSES "ACTUAL"

ITEM	$\bar{X}$	s^2	N
1 Assess constraints	65.465	745.249	409
2 Update personnel	75.000	700.993	404
3 Inform organization	52.879	796.951	404
4 Needs analyzed	55.381	840.487	409
5 Client outline	64.388	985.248	407
6 Entry behavior	51.169	948.003	409
7 Select personnel	60.931	1236.993	406
8 Establish scope	71.853	679.826	409
9 Select media	79.890	613.284	409
[illegible]	76.478	664.477	406
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	61.066	907.808	409
19 Summative evaluation	71.707	739.174	409
20 Modify instruction	75.919	538.158	408
21 Criterion evaluation	59.445	894.444	409
22 Learner feedback	78.924	645.653	408
23 Tests based on obj.	67.086	985.417	409
24 Envir. based on obj.	56.607	908.556	405
25 Staff/Mgt. controls	36.767	1036.963	407
26 Train instructors	67.740	1002.556	408

$\bar{x}$ = mean response to item (in terms of percentage of time practiced)
s^2 = variance
N = number of responses to item

instructional development behaviors which are actually practiced less than 50% of the time: items 14, 15, and 25.

Item 14 (the use of learning taxonomies) elicited a combined mean response of 37.534%. This mean response was higher than that for business respondents (33.575%) and lower than that for education respondents (44.565%). Therefore, the combined mean response for this item was somewhat reduced as a result of the business responses. As was previously stated, the low mean response from business respondents may be attributable to such factors as the lower level of formal education attained by these respondents, the lack of sophistication of business ID clients regarding the instructional development process, and the attitude of these clients that the use of a specified learning taxonomy is not worth the concomitant time investment.

Item 15 (the availability of remedial instruction) elicited a combined mean response of 44.963%. Again, this percentage was lowered somewhat by the mean response for business respondents (43.702%), as opposed to that for education respondents (47.211%). As was stated earlier, this may be due to the somewhat infrequent and often poorly structured evaluation of trainees in business settings, and to the reluctance or inability of business training departments to invest the time and resources needed to offer remediation. In educational settings, it may be the individual faculty member who must bear the burden of providing remedial help for students. Most faculty members, it may be hypothesized, have neither the time (due to heavy student loads and course assignments) nor the inclination (What organizational reward or even support exists to help such an effort?) to provide remediation. Often, the faculty member is rewarded (via tenure, for example) based on publications, and not rewarded for any "extra effort" at improving the quality or effectiveness of his/her instruction.

Item 25 (the use of some specified technique for establishing staff and management controls for the ID process) elicited a combined mean response of 36.767%. Once again, this percentage was somewhat reduced by the mean response for business respondents (35.641%), as opposed to that for education respondents (38.8%). It may be that many business respondents are not familiar with these specific techniques, or that staff and management controls are more informally established among ID project members who have developed a consistent "routine" for assignment of responsibilities, establishing channels of communication, setting a schedule for accomplishing project objectives, and other tasks involved in the establishment of staff and management controls. Education respondents may often view the establishment of staff and management controls as unnecessary, since the majority of ID projects in higher education are relatively small-scale projects, often carried out by an individual instructional developer for an individual faculty member or department over a relatively short period of time.

Combined Business and Education - Ideal

As shown in Table 26, the combined group of respondents (business and education) did not indicate that any of the 26 instructional development behaviors should be practiced less than 50% of the time under "ideal circumstances." This, of course, logically follows the failure of either subgroup to identify any such items.

Differences Between Related Group Means

Calculations for The Differences Between Related Group Means were based on the group means obtained for the actual and ideal responses given by the business and education subgroups, and for the total combined sample (business and education). These group means are tabulated in Tables 21-26.

Table 26. COMBINED (Bus. and Ed.) ID ITEM RESPONSES
"IDEAL"

ITEM	$\bar{X}$	s^2	N
1 Assess constraints	88.963	386.759	410
2 Update personnel	95.074	167.032	406
3 Inform organization	58.127	778.011	403
4 Needs analyzed	88.537	351.154	410
5 Client outline	89.676	391.060	408
6 Entry behavior	89.303	309.624	409
7 Select personnel	80.370	541.942	405
8 Establish scope	91.687	240.162	409
9 Select media	94.544	195.144	411
10 Select materials	90.496	334.138	409
11 Differentiate needs	86.551	483.973	408
12 Site visitation	85.549	553.182	410
13 Behavioral objectives	89.738	314.007	408
14 Learning taxonomy	69.785	829.207	400
15 Remedial instruction	79.743	699.505	409
16 Test learners	89.610	353.515	410
17 Indiv. differences	83.356	438.166	410
18 Formative evaluation	87.840	359.839	406
19 Summative evaluation	95.844	126.676	409
20 Modify instruction	96.007	109.616	410
21 Criterion evaluation	87.010	394.557	407
22 Learner feedback	95.063	179.453	410
23 Tests based on obj.	93.337	232.768	409
24 Envir. based on obj.	89.431	329.047	408
25 Staff/Mgt. controls	73.536	693.300	399
26 Train instructors	93.980	231.532	407

$\bar{x}$ = mean response to item (in terms of percentage of time practiced)
s^2 = variance
N = number of responses to item

A total of five comparisons were made and values calculated to identify significant differences between the mean responses in each comparison. These five comparisons are as follows:

1. Business subgroup responses : Actual vs. Ideal
2. Education subgroup responses: Actual vs. Ideal
3. Total (combined business and education responses) : Actual vs. Ideal
4. Actual responses : Business subgroup vs. Education subgroup
5. Ideal responses : Business subgroup vs. Education subgroup

Calculation of values followed the procedure described by Chase (1976).

The five comparisons listed above, and the resultant z values, are tabulated in Tables 27 - 29. These comparisons will be discussed in three stages. First, comparisons 1 (Business subgroup responses: Actual vs. Ideal) and 2 (Education subgroup responses: Actual vs. Ideal) will be discussed. Second, comparison 3 (Total, or combined, business and education responses: Actual vs. Ideal) will be examined. Third, comparisons 4 (Actual responses: Business subgroup vs. Education subgroup) and 5 (Ideal responses: Business subgroup vs. Education subgroup) will be discussed.

Table 27. DIFFERENCES BETWEEN RELATED GROUP MEANS (in z values) FOR ACTUAL AND IDEAL RESPONSES FROM BUSINESS AND EDUCATION SUBGROUPS

		BUSINESS	EDUCATION
	ITEM	Actual/Ideal	Actual/Ideal
1	Assess constraints	-11.16	-8.72
2	Update personnel	-11.02	-8.18
3	Inform organization	-1.18	-2.89
4	Needs analyzed	-13.21	-11.39
5	Client outline	-11.79	-7.49
6	Entry behaviors	-16.59	-14.22
7	Select personnel	-7.49	-5.59
8	Establish scope	-10.64	-7.82
9	Select media	-7.80	-6.97
10	Select materials	-6.44	-6.37
11	Differentiate needs	-14.13	-9.92
12	Site visitation	-6.96	-7.82
13	Behavioral objectives	-9.81	-6.36
14	Learning taxonomy	-12.63	-8.71
15	Remedial instruction	-11.90	-12.12
16	Test learners	-13.04	-6.84
17	Indiv. differences	-13.95	-13.39
18	Formative evaluation	-11.13	-10.58
19	Summative evaluation	-12.64	-10.76
20	Modify instruction	-12.08	-10.78
21	Criterion evaluation	-12.47	-9.34
22	Learner feedback	-7.50	-9.04
23	Tests related to objectives	-11.02	-11.06
24	Environment(s) selected based on objectives	-13.33	-13.91
25	Staff/management controls	-13.54	-11.65
26	Train instructors	-11.04	-11.38

NOTE: 1) z values equal to or greater than ± 1.96 indicate significant differences at the .05 level or beyond.

2) Negative z values indicate higher means for the ideal scale responses.

Table 28. DIFFERENCES BETWEEN RELATED GROUP MEANS (in z values) FOR ACTUAL AND IDEAL RESPONSES OF COMBINED (BUSINESS AND EDUCATION GROUP)

ITEM		Actual/Ideal Differences
1	Assess constraints	-14.13
2	Update personnel	-13.70
3	Inform organization	-2.66
4	Needs analyzed	-19.43
5	Client outline	-13.76
6	Entry behaviors	-21.74
7	Select personnel	-9.28
8	Establish scope	-13.22
9	Select media	-10.42
10	Select materials	-8.95
11	Differentiate needs	-17.25
12	Site visitation	-10.17
13	Behavioral objectives	-11.49
14	Learning taxonomy	-15.23
15	Remedial instruction	-16.46
16	Test learners	-14.33
17	Individual differences	-19.05
18	Formative evaluation	-15.20
19	Summative evaluation	-16.59
20	Modify instruction	-15.94
21	Criterion evaluation	-15.51
22	Learner feedback	-11.36
23	Tests related to objectives	-15.21
24	Environment(s) selected based on objectives	-18.80
25	Staff/Management controls	-17.76
26	Train instructors	-15.08

NOTE: 1) z values equal to or greater than ± 1.96 indicate significant differences at the .05 level or beyond.

2) Negative z values indicate higher means for the ideal scale responses.

Table 29. DIFFERENCES BETWEEN RELATED GROUP MEANS (in z values) FOR BUSINESS AND EDUCATION SUBGROUPS ON ACTUAL AND IDEAL RESPONSE SCALES

ITEM	ACTUAL Business/Education	IDEAL Business/Education
1. Assess constraints	0.37	0.42
2 Update personnel	0.85	0.57
3 Inform organization	3.74	1.47
4 Needs analyzed	-1.37	-0.89
5 Client outline	-3.24	-2.84
6 Entry behavior	-0.35	-1.53
7 Select personnel	2.01	2.40
8 Establish scope	-0.05	-0.37
9 Select media	1.02	-.007
10 Select materials	1.29	-0.02
11 Differentiate needs	-0.05	0.50
12 Site visitation	1.05	-1.48
13 Behavioral objectives	1.89	2.82
14 Learning taxonomy	-3.40	-2.55
15 Remedial instruction	-1.06	-2.85
16 Test learners	-5.43	-2.21
17 Indiv. differences	1.41	-0.46
18 Formative evaluation	-0.08	-2.64
19 Summative evaluation	0.85	-0.90
20 Modify instruction	3.64	2.16
21 Criterion evaluation	-2.32	-2.08
22 Learner feedback	3.30	0.11
23 Tests related to objectives	0.005	-1.94
24 Environment(s) selected based on objectives	3.88	0.66
25 Staff/management controls	-0.96	-1.48
26 Train Instructors	6.49	3.67

Note: 1) z values equal to or greater than ± 1.96 indicate significant differences at the .05 level or beyond

2) Negative z values indicate higher means for the education subgroup responses.

Business and Education Subgroups: Actual vs. Ideal

Table 27 shows The Difference Between Related Group Means for all instructional development behavior items (1-26) on both the actual and ideal scales for both the business and education subgroups. The z values under the "Business" column show that business respondents indicated that all 26 instructional development behaviors should be practiced more often under ideal circumstances than they are currently being practiced. Significant differences (at the .05 confidence level or beyond) between actual and ideal practice of the ID behaviors were present for all items, except for item 3 (informing the organization of its instructional needs). Even though this item was an "experimental" item, mean business responses for the actual and ideal scales were both above the 50% level (56.807% and 59.668%, respectively).

Education respondents indicated significantly greater ideal means (versus actual means) for all 26 instructional development behaviors. The comparisons tabulated in Table 27 are graphically illustrated in Figure 15 (business subgroup responses: actual vs. ideal scales) and in Figure 16 (education subgroup responses: actual vs. ideal scales). The reader's attention is especially directed to the position of item 3 in both of these

FIGURE 15. BUSINESS ID ITEM RESPONSES: ACTUAL VS. IDEAL

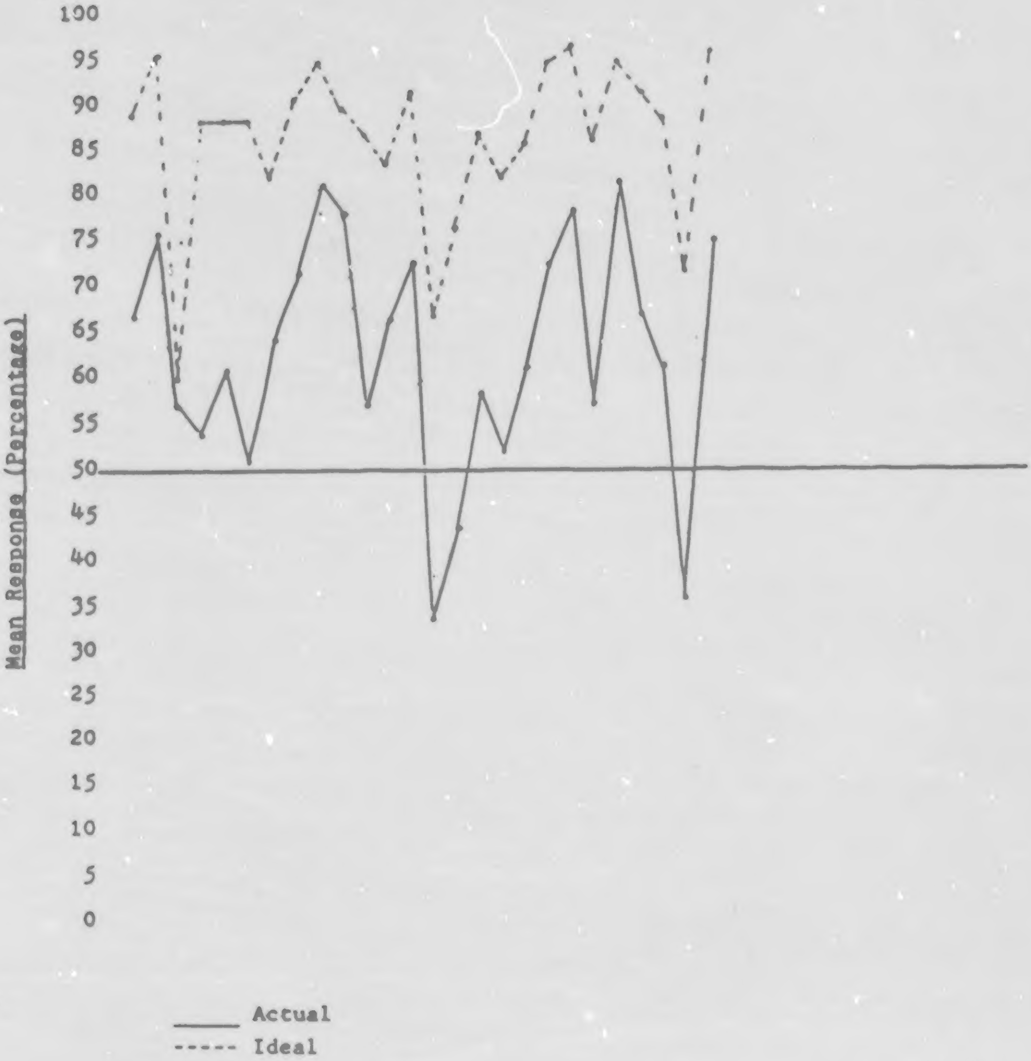
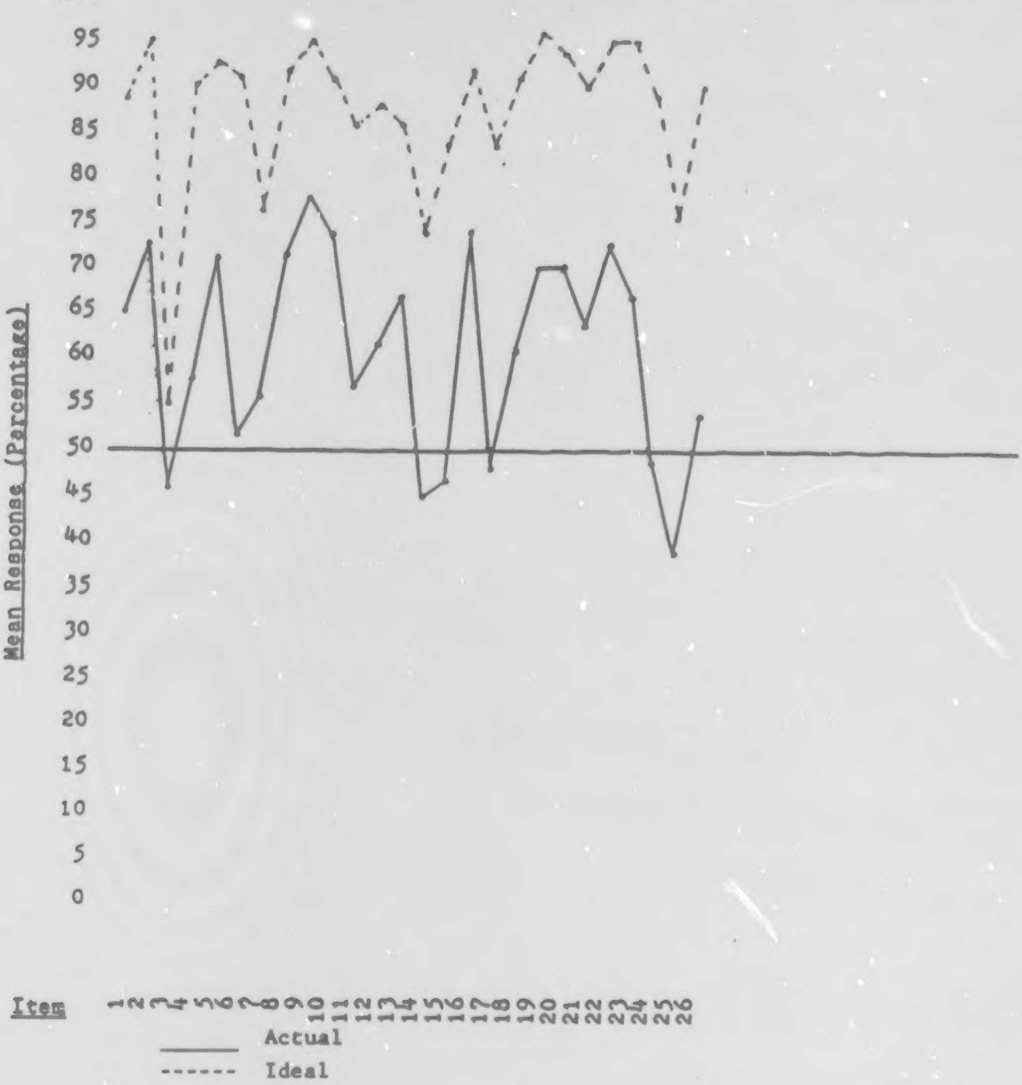


Figure 16. EDUCATION ID ITEM RESPONSES: ACTUAL VS. IDEAL

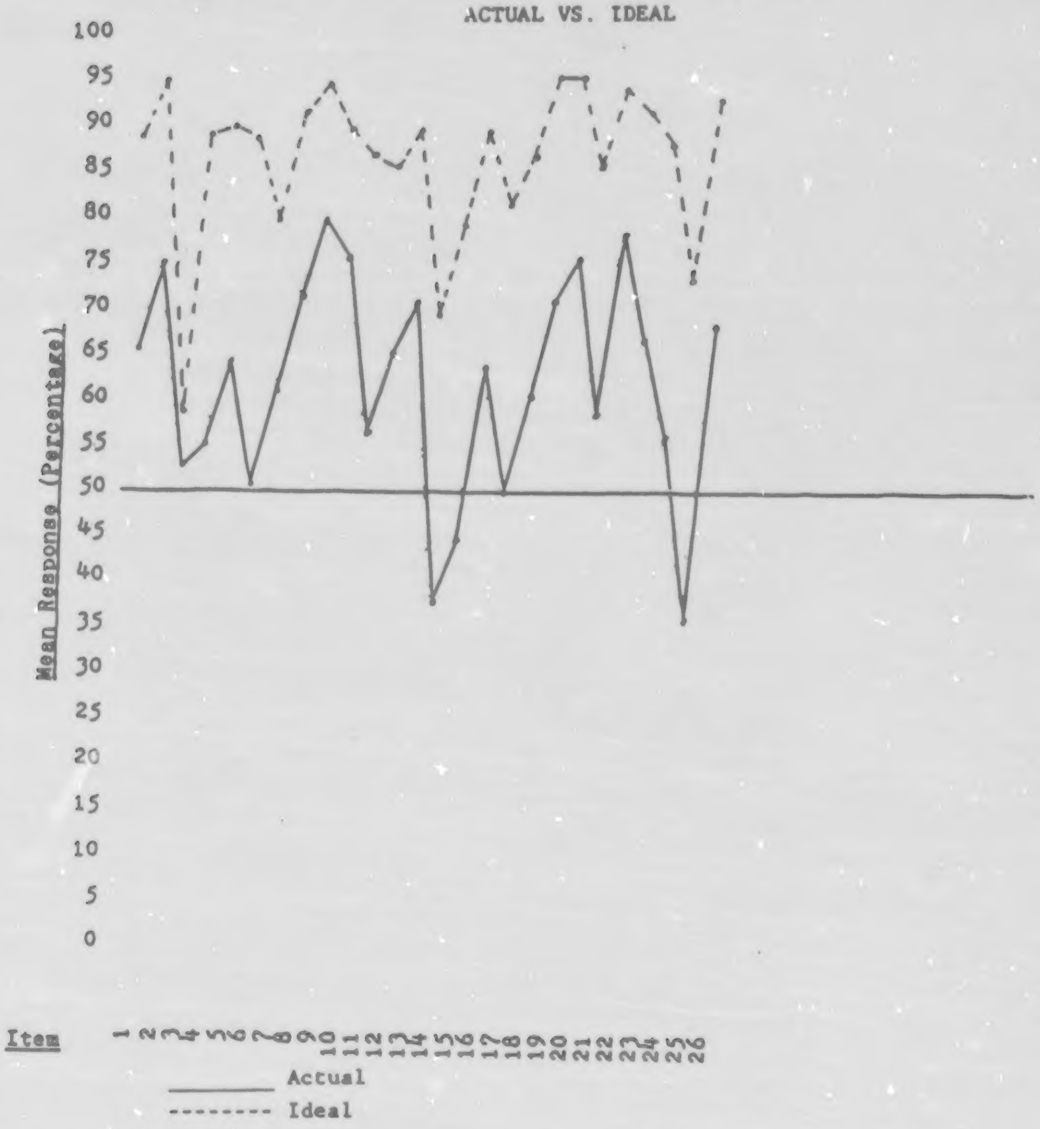


figures. Clearly, there is less difference between the actual and ideal responses to item 3 than to any of the other 26 instructional development behavior items.

Table 28 shows The Difference Between Related Group Means (expressed in z values) for actual and ideal responses of the combined group (the business and education subgroups together). Thus, Table 28 represents the responses of the total group of 411 survey respondents to all 26 instructional development behavior items on both the actual scale and ideal scale. It should be noted that, for this combined (or total) response group, a significant difference (at the .05 confidence level or beyond) was indicated between every item on the actual scale and its ideal scale counterpart. That is, the total response group (business and education subgroups combined) indicated that every one of the 26 instructional development behaviors should be practiced significantly more often than it is now practiced. Figure 17 illustrates the difference between the actual and ideal mean responses for the total (business and education) response group.

Clearly, both business and education respondents indicate a tremendous difference between the ways in which the instructional development process is currently practiced and the way in which the respondents think it should be practiced. Many possibilities have been cited for the

Figure 17. TOTAL (Bus. & Ed.) ID ITEM RESPONSES:
ACTUAL VS. IDEAL



differences between "actual" and "ideal" responses. Some of the major constraints which serve to limit the instructional developer's freedom to practice ID as he/she might think it should be practiced include such factors as organizational policy limitations; lack of time, resources or commitment to the instructional development process; ID clients who are not knowledgeable about instructional development and/or are unwilling to increase that knowledge; lack of sufficient organizational power or influence on the part of the ID agency; lack of formal education (especially related to instructional development) of instructional developers; infrequent and/or ineffective communication between the instructional developer and the client or between the instructional developer and the organization; and other factors.

Table 29 shows The Difference Between Related Group Means (expressed in z values) for the business and education subgroups on actual and ideal response scales. The questions to be answered here are the following:

1. What significant differences (if any) exist between the mean responses of the business subgroup and the education subgroup on all 26 "actual" scale ID behavior items?
2. What significant differences (if any) exist between the mean responses of the business subgroup and the education subgroup on all 26 "ideal" scale ID behavior items?

In terms of responses on the "actual" scale, the mean responses for the education subgroup (149 education respondents) were significantly greater for items 5 (re: client outline), 14 (re: learning taxonomies), 16 (re: testing learners), and 21 (re: criterion evaluation) than were the mean responses for the business subgroup (262 business respondents).

Outlining proposed instruction with the ID client (item 5) may be practiced more often in educational environments for several reasons. First, the client is often an individual faculty member, as opposed to an entire unit or a group of line managers in business settings. Consequently, review of a preliminary outline is more easily and quickly accomplished in many instructional development relationships in higher education. Second, university faculty members may have a greater personal investment in the quality of the instruction, since they themselves implement the instruction. Third, university faculty members are generally more sophisticated ID clients than are the clients of the instructional developer in business. Therefore, communication between the developer and the faculty member client is more easily facilitated.

Education respondents utilized learning taxonomies (item 14) more often than did business respondents. Possible explanations for this include the lower average level of formal education held by business respondents, the lower level of sophistication of ID clients in business regarding the ID process, and the concomitant attitude among these clients that the utilization of learning taxonomies is prohibitively time consuming.

Regarding item 16, it may be submitted that learner achievement evaluation (of some kind) is the norm in education (mean response of 74.252%). However, while most business respondents did report that such evaluation was carried out (mean response of 58.241%), many business organizations do not routinely evaluate trainee (learner) performance. Reasons include constraints imposed by governmental regulations (e.g., E.E.O.C. regulations), lack of organizational commitment to the evaluation process (or to training itself), lack of validated evaluation instruments, and absence of any plan for making use of the data obtained as a result of evaluation.

Similar rationale may be provided for the more frequent utilization of criterion-referenced evaluation (item 21) in educational environments. Although there was no significant difference between the mean responses of the business subgroup and the education subgroup in the percentage of time instructional objectives were stated in behavioral terms (item 13), it may be that the higher level of formal education of the education subgroup could contribute to their knowledge of how to integrate behaviorally stated instructional objectives with learner evaluation.

The "actual" scale mean responses for the business subgroup were significantly greater for items 3 (re: informing the organization of its instructional needs), 7 (re: selection of ID personnel), 20 (re: modifying instruction), 22 (re: obtaining learner feedback), 24 (re: selection of instructional environment), and 26 (re: instructor training) than were the actual scale mean responses for the education subgroup.

According to the responses to item 3, instructional developers in business tend to be more proactive than do their colleagues in education -- at least, insofar as informing their organizations of instructional needs. Instructional developers in higher education often work with individual faculty members on relatively small-scale projects. Therefore, the opportunities to interface with the rest of the institution are reduced.

Business respondents also seem to indicate more autonomy in selecting the ID personnel who will work on a given ID project (item 7). Perhaps one reason for this phenomenon is the fact that instructional development (or training) units or agencies in business organizations tend to be more highly structured and remain relatively constant from one project to another. In other words, the "selection" of ID personnel in business may, in many cases, be somewhat predetermined by present staff. Another reason could be the greater availability of outside vendors (e.g., consultants) to business. Most training and development departments in business have a portion of their budget reserved for such use; whereas, this is not typically the case in education.

Business respondents indicated that they modify instruction "to meet changing needs" (item 20) more often than do respondents from education. Courses and curricula in universities can often remain relatively unchanged over several cycles (i.e., offerings of the course or curriculum), since the major characteristics of the learner population remain fairly constant. However, learner populations in business training programs change considerably, both in terms of entry level characteristics and in terms of a higher turnover rate in the learner population. Also, the content validity of instructional materials in training programs must be constantly assessed due to rapid changes in the training needs of the learners, especially in the more technical areas of training.

Learner feedback (item 22) is elicited more often by business respondents. This would logically proceed from the fact that instruction is modified more often in business environments (item 20), since learner feedback is a valuable source of information upon which to base such revision.

Business respondents report a significantly greater degree of flexibility regarding selection of instructional environments "based on suitability for achieving the objectives of instruction" (item 24). Instructional developers in education, as well as faculty, may operate on the assumption that most instruction will take place in a classroom -- because it is "supposed to" take place there. Most often, of course, the classroom environment is appropriate for the delivery of instruction. Laboratories, field studies and other exceptions do not make up the majority of instructional environments. Also, business organizations often have a great degree of flexibility in terms of offering "off-site" training. Hotels, conference centers and even university campuses are often utilized -- especially for the delivery of management training.

Regarding item 26 (training of instructors), it would seem logical to conclude that education respondents feel that specific attempts to train university faculty to interact with learners would be unnecessary in many cases, since these faculty are generally experienced in interacting with students and generally have a greater opportunity to do so (e.g., regular office hours, campus social and extracurricular events, regular classroom contact). University faculty are also generally very familiar with the content of instruction. Conversely, business training programs often utilize non-instructional personnel (e.g., line managers or technical staff) as instructors. These personnel are often unfamiliar with the specific content of the instruction, are even more often very inexperienced in the effective delivery of instruction, and generally do not interact with the learners (trainees) outside of the instructional delivery situation.

Referring again to Table 29, similarities in the "actual" scale and the "ideal" scale responses for the business and education subgroups are readily apparent. Ten significant differences were discovered between the business subgroup and the education subgroup on the "ideal" scale (i.e., items 5,7,13,14,15,16,18,20,21, and 26). However, seven of these significant differences were "carryovers" from the actual scale (i.e. items 5,7,14,16,20,21, and 26). Since possible reasons for these significant differences (on the actual scale) have already been proposed, the remainder of the present discussion will focus on the three remaining items (i.e., items 13,15, and 18) for which significant differences were present only on the ideal scale.

No significant difference existed between business and education respondents regarding the actual practice of behaviorally stating instructional objectives (item 13). However, business respondents claimed that this behavior should be practiced 91.731% of the time under ideal circumstances, while education respondents provided a mean ideal response of only 86.236% (a significant difference at the .05 level). This may be partially attributable to the specificity of the competencies which learners are expected to attain in business, as opposed to in education. While this distribution certainly does not always hold true the specific nature of training (versus the more general nature of education) lends itself to performance criteria which are more readily measured (e.g., training a trainee how to operate a machine, how to complete a report form, or how to conduct an employee's performance review according to company policy). Training and education cannot be so easily and neatly separated, of course. Nevertheless, the differences just mentioned may be influential enough to account for part of the significant difference between the business and education subgroups on this behavior.

Item 15 (re: providing remedial instruction) and item

18 (re: formative evaluation) were both items which education respondents claimed should be practiced significantly more often than did business respondents. Business respondents provided a mean ideal response for item 15 of only 77.115%, as opposed to 84.329% for education respondents. Business respondents provided a mean ideal response for item 18 of only 86.097%, as opposed to 90.878% for education respondents. The practice of both of these behaviors necessitates the investment of a considerable amount of time in the instructional development process. Previous discussion has indicated that time is often a precious commodity for the instructional developer, especially in business environments, where the demands of relatively unsophisticated clients (regarding the ID process) mandated deadlines, and productivity pressures often force the instructional developer to "settle for less" than might be desired. Such could be the case with the responses to items 15 and 18. The ideal scale responses from the business subgroup may indicate a realization of these constraints -- projected even into an "ideal" set of circumstances.

Correlational Analysis of Survey Items

A correlation matrix for all demographic and ID behavior survey items may be found in Appendix D (Tables A-I).

Examination of the total correlation matrix reveals only fourteen correlation coefficients at or above .50 (+ or -). These correlations, summarized in Table 30, seem to provide confirmation of the analysis of The Differences Between Related Group Means.

A four-digit code number was assigned to each survey respondent. The first digit of the code number indicated whether the respondent represented the education subgroup or the business subgroup. A code number beginning with the digit "1" represented a business respondent; a code number beginning with the digit "2" represented an education respondent. However, the first demographic item (survey item #27) required a response of "1" for education respondents and a response of "2" for business respondents. In addition, three other possible responses were provided (i.e., "3", "4" or "5"). The negative correlation between the code number and the first demographic item reflects this response pattern.

Moderate correlations were found between "actual" and "ideal" scale responses for nine ID behavior items (i.e., #3,5,7,8,12,14,15,18 and 25). Since analysis of The Differences Between Related Group Means revealed significant differences (at the .05 level or beyond) for all 26 ID behavior items between the "actual" and "ideal" scale responses, these nine correlations seem to reinforce the

Table 30. CORRELATIONS AT OR ABOVE .50 (+ or -)

Correlation Between:		Correlation Coefficient:	Found in Table ( ) in Appendix D:
CODE / DEM1	CODE #/ EMPLOYING ORG.	-.61	A
AV3 / IV3	INFORM ORG. OF ID NEEDS	.69	B
AV5 / IV5	OUTLINE INSTRUCTION	.53	D
AV7 / IV7	SELECT ID PERSONNEL	.60	D
AV8 / IV8	DETERMINE SCOPE	.54	D
AV12 / IV12	SITE VISITATION	.69	D
AV14 / IV14	LEARNING TAXONOMY	.60	E
AV15 / IV15	REMEDIAL INSTRUCTION	.53	E
AV18 / IV18	FORMATIVE EVALUATION	.54	F
AV25 / IV25	STAFF/MGT. CONTROLS	.57	G
AV13 / AV23	BEHAVIORAL OBJ./ TESTS BASED ON OBJ.	.52	C
AV16 / AV21	TEST LEARNERS / CRITERION EVALUATION	.58	E
AV18 / AV19	FORMATIVE EVALUATION/ SUMMATIVE EVALUATION	.50	E
AV21 / AV23	CRITERION EVALUATION/ TESTS BASED ON OBJ.	.58	E

findings of that analysis.

The final four correlations listed in Table 30 refer to relationships between various ID behavior items on the "actual" scale responses. Item 13 (re: behaviorally stated objectives) is moderately correlated with item 23 (re: tests based on objectives). It would seem, therefore, that respondents who base tests on instructional objectives tend to state those objectives in behavioral terms. Item 16 (re: test learners) is moderately correlated with item 21 (re: criterion evaluation). Therefore, respondents who test learners seem to have a tendency to base these tests on some pre-determined criteria. The moderate correlation between item 18 (re: formative evaluation) and 19 (re: summative evaluation) seems to suggest that respondents who evaluate instruction throughout the ID process tend to evaluate the "final product" on a summative basis. Item 21 (re: criterion evaluation) is moderately correlated with item 23 (re: tests based on objectives). It would appear, therefore, that respondents who state instructional objectives behaviorally also tend to utilize those objectives in determining the criteria upon which learners are evaluated.

Chapter IV discussed the analysis and the findings of the data. The discussion focused on the four statistical analyses which were performed: a descriptive statistical analysis of the total sample of respondents, a descriptive listing of the instructional development process behavior items (1-26), calculations for The Differences Between Related Group Means, and a correlational analysis for all survey items.

Analysis of the descriptive data for the total response group (411 respondents) indicates that most ID professionals (64% of total response group) are at least fairly experienced (6 or more years in the ID field) and that most (77.9% of the total response group) hold graduate degrees. A very large percentage (92.3%) of the total response group claimed membership in one or more professional organizations related to the development of instruction, indicating a high level of professional affiliation among current ID professionals. The majority of currently active ID professionals projected a relatively long-term commitment to the profession, 63% of the total response group claiming that they planned to "stay in the field of ID (given the choice)" for four years or more.

Analysis of the instructional development process behavior items (1-26) indicates that the majority of these behaviors are currently practiced by both business and education respondents. Business respondents indicated that only three of the listed behaviors are actually practiced less than 50% of the time. These were items 14 (re: use of a learning taxonomy), 15 (re: availability of remedial instruction) and 25 (re: establishment of staff and management controls). Education respondents indicated that only six of the listed behaviors were actually practiced less than 50% of the time. These were items 3 (re: informing the organization of its instructional needs), 14 (re: use of a learning taxonomy), 15 (re: availability of remedial instruction), 17 (re: provision for individual differences), 24 (re: selection of learning environment based on instructional objectives) and 25 (re: establishment of staff and management controls). As a total response group (business and education respondents combined), respondents indicated that only three of the listed behaviors were actually performed less than 50% of the time. These were the same items which were indicated by the business respondents alone (items 14,15, and 25).

When asked to indicate the percentage of time which each of the ID behaviors should be practiced under "ideal circumstances," respondents indicated that all listed behaviors should be practiced at least 50% of the time. This held true for each of the subgroups (business respondents as one subgroup and education respondents as the other subgroup), as well as for the total response group (business and education respondents combined).

Rationale for the above findings was provided. Calculations for The Differences Between Related Group Means were conducted, tabulated and analyzed. Findings for the five comparisons which were made may be summarized as follows:

Comparison #1: For business respondents, a significant difference (at the .05 level or beyond) existed between all actual and ideal responses, except for item 3 (re: informing the organization of its instructional needs). That is, business respondents felt that all ID behaviors (except item 3) should be practiced significantly more often than they are now practiced.

Comparison #2: For education respondents, a significant difference (at the .05 level or beyond) existed between all actual and ideal responses. That is, education respondents felt that all ID behaviors should be practiced significantly more often than they are now practiced.

Comparison #3: For the total response group (business and education respondents combined), a significant difference (at the .05 level or beyond) existed between all actual and ideal responses. That is, the total response group felt that all ID behaviors should be practiced significantly more often than they are now practiced.

Comparison #4: Education respondents practice the following behaviors significantly more often (at the .05 level or beyond) than do business respondents: item 5 (re: review of proposed instruction with client), 14 (re: use of a learning taxonomy), 16 (re: testing learners) and 21 (re: use of criterion-referenced evaluation). Business respondents practice the following behaviors significantly more often (at the .05 level or beyond) then do education respondents: item 3 (re: informing the organization of its instructional needs), 7 (re: selection of personnel), 20 (re: modification of instruction), 22 (re: obtaining learner feedback), 24 (re: selection of learning environment based on instructional objectives) and 26 (re: training of instructors).

Comparison #5: Education respondents felt that, under "ideal circumstances," the following behaviors should be practiced significantly more often (at the .05 level or beyond) than did business respondents: item 5 (re: review of proposed instruction with client), 14 (re: use of a learning taxonomy), 15 (re: providing remedial instruction), 16 (re: testing learners), 18 (re: conducting summative evaluation), and 21 (re: use of criterion-referenced evaluation). Business respondents felt that, under "ideal circumstances," the following behaviors should be practiced significantly more often (at the .05 level or beyond) than did education respondents: items 7 (re: selection of personnel), 13 (re: specification of behavioral objectives), 20 (re: modification of instruction) and 26 (re: training of instructors).

The above findings were discussed and rationale proposed.

Finally, the correlational analysis provides confirmation of the results of Calculations for The Differences Between Related Group Means.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

As a result of the findings of the survey data, the following conclusions may be drawn in response to the central questions addressed in this study:

1. The first central question asked:

> To what extent does the process of instructional development (ID) differ in its actual practice in higher education from its practice in business/industry?

Calculations for The Differences Between Related Group Means conducted for Comparison #4 (Actual responses: business subgroup vs. education subgroup) reveal that education respondents practice the following behaviors significantly more often (at .05 level or beyond) than do business respondents:

a. review of proposed instruction with client (item 5)
b. use of a learning taxonomy (item 14)
c. testing learners (item 16)
d. use of criterion-referenced evaluation (item 21)

Conversely, business respondents practice the following behaviors significantly more often (at .05 level or beyond) than do education respondents:

a. informing the organization of its instructional needs (item 3)
b. selection of personnel (item 7)

c. modification of instruction (item 20)
d. obtaining learner feedback (item 22)
e. selection of learning environment based on instructional objectives (item 24)
f. training of instructors (item 26)

In general, it may be concluded from the above findings that both education and business respondents are affected by the constraints of their respective environments. While this may seem like a statement of the obvious, what needs to be emphasized is that, based on inferences from the findings, each of these environments seem to impose only limited, unique constraints which are not also imposed by the other environment. For example, instructional development professionals in education possess a higher level of formal education than business respondents, since a higher level of formal education is often required. Consequently, education respondents may be expected to engage in more "sophisticated" ID behaviors. Their significantly higher response to item 14 (re: use of a learning taxonomy) would seem to support this inference. The testing of learners (item 16) and the closely-related behavior concerning the use of criterion-referenced learner evaluation (item 21), practiced significantly more often by education respondents, may also be primarily attributed to environmental constraints of business respondents. In many business organizations, the testing of learners is not carried out with the rigor and the organizational support (or even mandate) which typifies testing procedures and policies in education. Also more common in education ID settings is a highly educated client who has a sophisticated level of knowledge concerning the instructional content and, in many cases, the instructional development process. It is not surprising, therefore, that education respondents review proposed instruction with their clients (item 5) significantly more often than do business respondents, since education ID clients could be more able to have relevant input into such issues as the selection, sequencing, delivery and evaluation of proposed instruction.

Business respondents, in general, seem to enjoy a greater degree of autonomy than do their counterparts in education. Again, environmental factors (as opposed to individual abilities and dispositions) may be held accountable. Business respondents, forming training units in their organizations, are often the only personnel in the organization believed to have expertise in the development of instruction. Consequently, they are able to engage in certain behaviors significantly more often (at .05 level or beyond) than are ID professionals in education. For example, business respondents inform their organizations of their (the organizations') instructional needs (item 3), select their own personnel for ID projects (item 7), and select the learning environment based on instructional objectives (item 24) significantly more often (at .05 level or beyond) than education respondents practice these behaviors. Another attribute of ID in business organizations is the relatively rapid change in the needed instruction and in the learner population. It is not surprising, therefore, that instruction is modified more often in business organizations (item 20), as needs change more often. Since learners are evaluated less often in business organizations, learner feedback via written or oral course evaluations may often be the only data available (subjective as it may be) concerning the "effectiveness" of the instruction. Consequently, learner feedback is obtained (item 22) significantly more often (again, at .05 level or beyond) by business respondents. While education respondents often work with clients who are, in fact, experienced university faculty, the necessity of "training" these faculty to interact with learners and to become familiar with the content of the instruction is greatly reduced. This may be compared to the situation in business in which instructors are often "line personnel" who have very little (if any) experience in the effective delivery of instruction. The training of instructors (item 26), therefore, becomes necessary more frequently in business than in education.

2. The second central question asked:

> To what extent do ID professionals in higher education differ from those in business/industry regarding the instructional development process as it should be practiced under "ideal circumstances"?

Only three items elicited significantly different mean responses (at .05 level or beyond) from the two respondent subgroups (business and education) on the "ideal" scale which were not also significant differences on the "actual" scale. These were items 13 (re: stating instructional objectives in behavioral terms), 15 (re: providing remedial instruction) and 18 (re: conducting formative evaluation).

Since training (instruction in business) most often addresses the performance of job-specific tasks, competencies required by the learners (and translated into instructional objectives) must be correspondingly specific and behaviorally stated. This may account for the significantly higher mean response of business respondents (at .05 level or beyond) regarding how often instructional objectives are stated in behavioral terms (item 13).

The demands of some uninformed (re: the ID process) clients, frequently stringent (and often unrealistic) project deadlines and other time-related factors may be organizationally imposed constraints which have a greater impact on ID professionals in business than on those ID professionals in education. Providing remedial instruction for learners who need or request it (item 15) and conducting formative evaluation of instruction (item 18) are both very time-consuming activites. Even under "ideal circumstances," business respondents indicated that they would practice these behaviors significantly less often (at .05 level or beyond) than did education respondents. Also, instructional developers in education seem to work more intensively with their clients than do their counterparts in business, as the significantly higher "ideal" mean response for education respondents on item 5 (re: review of proposed instruction with the client) may indicate. This "intense" developer-client relationship, along with the more "sophisticated" nature of the ID client in education, would seem to provide support for the significantly higher "ideal" mean response (at .05 level or beyond) for education respondents on item 18 (re: conducting formative evaluation), since this behavior is time-consuming and is facilitated by a close, cooperative developer-client relationship. Further rationale for the significantly higher "ideal" mean response (at .05 level or beyond) for education respondents on item 15 (re: providing remedial instruction) may be traced to the time-dependent nature of instruction in education. The learner has a fixed period of time (e.g., one semester) to achieve a satisfactory level of performance (i.e., to "pass" a course). In the interests of facilitating the "success" of as many learners as possible within a pre-determined period of time, therefore, provision of some form(s) of remedial instruction would be desirable.

3. The third central question asked:

> What a significant differences, if any, exist between the instructional development process as it is now practiced and as it "should be" practiced under "ideal circumstances" by ID professionals in higher education and in business/industry?

Insofar as the business subgroup was concerned, the only item which did not elicit a significantly higher mean response (at .05 level or beyond) on the "ideal" scale (versus the "actual" scale) was item 3 (re: informing the organization of its instructional needs). Although business respondents currently inform their organizations of their (the organizations') instructional needs about 56.8% of the time, they report that under "ideal circumstances" they would do so only about 59.7% of the time. Perhaps this limited increase on the "ideal" scale reflects a feeling among business respondents that their ability to take such a proactive approach is limited. Therefore, these respondents may feel that even under "ideal" circumstances, their ability (or responsibility) to practice this behavior would be limited by such factors as organizational goals and training unit functions lying outside of their sphere of control.

All other items on the "ideal" scale elicited significantly higher mean responses (at .05 level or beyond) for business respondents than did the corresponding "actual" scale item responses.

Insofar as the education subgroup was concerned, all items on the "ideal" scale (without exception) elicited significantly higher mean responses (at .05 level or beyond) than did the corresponding "actual" scale item responses.

Based on the preceding discussion of specific conclusions drawn from the findings of the data, the following general conclusions are drawn:

1. In spite of isolated differences between education and business respondents, it appears that the instructional development process, when viewed holistically, is basically practiced the same in both settings.
2. Both business and education respondents seem to indicate that signficant "gaps" exist between usually practiced instructional development process behaviors and those behaviors which should be practiced under "ideal circumstances." Respondents felt that the ID behaviors included

in the survey should be practiced significantly more often than they are currently practiced.

3. An open-systems model of instructional development which would be applicable in both educational and business (non-educational) organizations, and which still provides for the idiosyncrasies of each setting, appears to be practicable.

Recommendations for Further Study

Based on the research completed for this present dissertation, the following recommendations for futher study are made:

1. Apply the proposed model in both educational and non-educational organizations in order to validate the model, in part or as a whole.
2. Apply the proposed model in other types of organizations engaging in instructional development (e.g., in the military) to determine its applicability in those organizations.
3. Administer the survey instrument to the same sample used in this study several years from now, to determine what significant changes, if any, have occured.
4. Conduct further research on the interpersonal

dimensions of instructional development, specifically:

   a. ID consulting skills
   b. requisite interpersonal communication skills of instructional developers (e.g., active listening, interviewing and counseling techniques, assertiveness)

5. Incorporate the interpersonal dimensions of ID (#4 above) into graduate-level instructional development programs.

Chapter VI presents a conceptual ID model based on open-systems theory. A proposed operational ID model is then presented which is based on the conceptual model, the findings of the current ID literature (Chapter II) and the findings of the ID survey (Chapter IV).

CHAPTER VI

AN INTEGRATIVE OPEN-SYSTEMS MODEL OF INSTRUCTIONAL DEVELOPMENT IN EDUCATIONAL AND NON-EDUCATIONAL ORGANIZATIONS

It is the intention of this present chapter to synthesize the discussion of the literature of systems and of instructional development, and the findings of the survey data in order to offer an operational model of instructional development which accurately reflects this synthesis. As the title of this present study suggests, the proposed model must fulfill two major requirements. First, it must accurately reflect an open-systems perspective of the instructional development process. Second, it must be applicable in both educational and non-educational organizations, thus serving to "integrate" the ID process in these two settings.

The first requirement (re: reflection of an open-systems perspective of the ID process) readily lends itself to assessment. Therefore, this chapter will focus on the following:

1. A conceptual model of instructional development, which will attempt to describe the major attributes of an open-systems model of instructional development.
2. An operational model of instructional development, which will build on the conceptual model, as well

> as on the systems and ID literature and on the findings of the survey data, in order to detail the goals, components, structure and functions of an "instructional system."

The ultimate success or failure of any model will depend on its ability to withstand an objective and rigorous validation process through application in various settings over an extended period of time (Rubinstein, 1975). Therefore, assessment of the extent to which the proposed model fulfills the second requirement (re: application in both education and non-educational organizations) is not possible within the scope of this present study.

The Conceptual Model

What should be the major attributes of an open-systems model of instructional development? First, since the model must represent the ID process as an open-system, it is necessary to articulate the essential characteristics of an open system, and to translate these characteristics into requisite capabilities of the ID model.

Katz and Kahn (1978) discuss ten characteristics of an open system. These characteristics will serve as the basis for the present discussion.

Input of Energy:

The first characteristic of an open system is its ability to import energy from the environment. An instructional development model which views the ID process as an open system would, therefore, provide for such input. This input could take the form of materials, personnel, funds, information, or any other resource which is allowed to enter the system. Allowance for input from the environment would also permit the instructional developer operating in such a system to more accurately assess the resources and constraints attendent in any given situation, to maximize the resources which are available, to obtain the information necessary to accurately define problems and generate alternative solution strategies, to assess and obtain needed expertise not possessed by the instructional system personnel for such activities as the content validation of instructional materials, and other capabilities.

Conversion of Energy:

An open system must also provide for throughput--"the conversion of energy input into forms more suitable to the needs of the system" (Davies, 1976, p. 284). The instructional development process must use the various forms of input (e.g., materials, personnel, funds, information) to help it achieve its goals. Use of these inputs could take the form of actual production of instructional materials, various problem-solving or decision making tasks, provision of support services (or support systems), information for revision of the process itself, or other types of "work" which must be done throughout the process.

Output of Energy:

An open system must generate some kind of energy into the environment. Instructional development systems generate both tangible and intangible outputs into their environments. Certainly, one tangible output would be the instructional materials which are produced. But an instructional development system must also generate some "intangible" outputs. The goal of an instructional system is to "bring about purposive and controlled learning" (AECT; Heinich, 1979, p. 21). Learning, or an increase in knowledge, skills or attitudes, is an output of an instructional system. Of course, the instructional system (or "instructional development system," or "IDS") should explicitly provide for the evaluation of this learning. This evaluation, in turn, must be based on the objectives of instruction. This is analogous to teleological behavior in systems -- behavior which is goal-directed and which has an objective or set of objectives. Instructional systems, too, must have objectives, for such will be the means by which their "outputs" are evaluated. Evaluation measures, then, should be directly related to the stated objectives of instruction.

Dynamic Interaction:

An open system must possess a dynamic structure (Katz and Kahn, 1978) which facilitates a "cycle of events" (p. 24) in the system. Stated simply, inputs are transformed into some type of work (throughput) in the system. These are then converted into outputs. These outputs, or portions of them, are the re-cycled back into the system as new inputs. Instructional systems must, therefore, not simply evaluate learner performance and obtain feedback on the effectiveness of specific aspects of the instruction; they must utilize this information and "re-cycle" it to provide the basis for remedial attention for learners, requests for additional resources, or modifications in the instructional development process itself. Additionally, these input-throughput-output-new input "cycles" must be actively facilitated among the various components or "steps" in the instructional development process. There must be a dynamic interaction among all components. The actions of one component have potential impact on all other components. Any open-systems model of instructional development must not only account for this phenomenon, but must explicitly describe how to take advantage of it. One way in which this could be accomplished is by sequencing steps in the ID process so as to maximize the interactive nature of the process. Another suggestion for an open-systems model of instructional development would be to "cluster" or group steps together which might be conducted in close temporal proximity to one another -- or even simultaneously. Finally, if the structure of such an instructional system is to be truly dynamic, then the structure should be capable of withstanding adjustment (to some extent) without jeopardizing the integrity or effectivenss of the instructional development process. Instead of a "lock-step" process, instructional development must maintain a certain degree of structual and procedural flexibility. One of the ways to facilitate such flexibility is through the utilization of resources imported from the environment to offset the entropic process.

Negentropy:

Negentropy, the counter-force to the process of entropy, is comprised of the cycle of input, throughout, and output. Katz and Kahn (1978) explain negentropy in the following terms:

> Within the limits of its storage capacity, an open system tends to maximize its ratio of imported to expanded energy, to survive and, even during periods of crises, to live on borrowed time. (p. 25).

An instructional system may possess negentropy by building up a reserve of resources. One of the ways a model of instructional development may accomplish this task is by a careful, systematic assessment of the resources which are available and of the constraints which might impinge upon the ID process. Therefore, an open-systems model of instructional development should explicitly provide for the assessment of available resources and existing or potential constraints. Another characteristic of such a model should be maximum utilization of existing resources. For example, careful analysis of existing instructional materials or media may reveal that these materials or media are suitable for the proposed instruction, thereby eliminating the need to expend funds for purchasing new materials or the need to commit personnel and other resources to the development of new materials or media. The model should also provide for frequent "checkpoints" at which progress made thus far is assessed, future steps are anticipated, and both "quality control and quality assurance" (Branson, 1981) are checked so that wasted time, effort and expense are kept to a minimum. Finally, information, materials or other "resources" generaged in one step of the process may be (and should be) used as inputs for other steps. Also, the information or materials generated in one ID project may often be profitably utilized in later projects. Thus, the instructional development process "feeds upon itself" in that its outputs are used later as inputs, either on new projects or in the continual revision of a given instructional system.

Feedback Processes:

Katz and Kahn (1978) submit that open systems take in information as a form of input, that they utilize negative feedback to correct deviations from their goals, and that they possess a coding process for the selective reception of inputs. It has already been established that an open-systems model of instructional development must import information as one of its most valuable forms of input, and that information is also one of its primary outputs. The use of negative feedback in such a model cannot be overemphasized. Steps in the model should continually feed information back (and forward) to other steps. Since the components of an open system (and the steps in an open-systems ID model) exhibit interdependence upon one another, the effects of the actions taken in one step must be "communicated" in some manner so that an assessment can be made of their effects on other steps either already taken (but subject to further input and revision) or yet to be taken. Boutwell (1979) explains that the components of the instructional development process are "synergistic in that the interactive relationship of the components strengthens the entire development process" (p. 32). The author points out that the ID process is also "cybernetic in that the cyclic effect of evaluative feedback continually modifies the input variables" (p. 32). An open-systems model of instructional development must also provide for the selective reception of inputs. Information, materials or other inputs that do not, in some way, contribute to the achievement of the system's goals would probably not be actively solicited. For example, information which is not needed simply results in a state of "information overload," which then becomes a constaint instead of a resource. Therefore, a careful delineation of the goals and objectives of the instructional system, as well as a control unit or "management subsystem" to monitor and control the flow of resources (including information) should be provided for in an open-systems ID model. The ability to selectively receive and utilize inputs also implies an effective communication process -- both among the components or subsystems of the instructional system itself, and between the instructional system and other systems.

Steady State:

Katz and Kahn (1978) characterize open systems as maintaining a steady state (or "dynamic homeostasis" or "dynamic equilibrium"). Basically, the maintenance of this "steady state" mean that the "character of the system" (p. 27) is preserved in the face of internal or external factors which threaten to disrupt the system. An open-systems model of instructional development must include steps (or sub-steps) which ensure, as much as possible, that possible changes or disruptions are foreseen, prepared for, and dealt with in such a manner that the essential characteristics and functions of the instructional system are not significantly affected. The importance of communication and of internal and external information exchange again becomes apparent. Katz and Kahn (1978) stress the importance of "the subsystems and their interaction in anticipating changes necessary for the maintenance of an overall steady state" (p. 27). An open-systems model of instructional development, therefore, possesses a great deal of flexibility in terms of its ability to adapt to frequent and/or rapid changes either within the instructional system or from the environment. All changes cannot be anticipated, but the ID system must pay close attention both to the environment and to its internal processes. Careful attention of the "management subsystem" to these factors will allow the system to more readily adapt to these changes and, where possible, channel their effects into useful sources of input. For example, new and unanticipated information entering the system should be treated, whenever possible, as an opportunity to improve the effectiveness of instruction. When this is not possible, the effects of the new input should at least be carefully assessed and strategies implemented for minimizing its disruptive effects on the instructional system. Another explicit step in an open-systems ID model should provide for continual future evaluation and revision of the instructional system. Through such a process, even significant "disruptions" can be provided for in future system modifications.

Differentiation:

Another characteristic of open systems is differentiation, the tendency toward structural or functional specialization. An instructional system must possess this characteristic by virtue of the nature of the instructional development process. The gathering, analysis and use of information regarding an instructional "problem," for example, must begin with very brief and most often general kinds of information. It is through the interaction of the different parties involved in the instructional development process that such information is elaborated upon; more specific information is brought out as the process continues and as the need arises. An open-systems model of instructional development must make allowances for this to happen. As an instructional developer works his/her way through the process, more detailed and specialized information will become available on a variety of issues. This would support the notion that an open-systems ID model must be flexible enough to be able to utilize this newly acquired information as it becomes available. First, such a model should provide for such things as "preliminary" or "tentative" decisions or products, since additional relevent and specific information may become available later which could substantially alter those decisions or products. For example, after a "tentative" decision has been reached to use video as one of the instructional media, specific information may be obtained which indicates that the available budget has been reduced, or that the equipment which was thought to be usable is either inoperable or incompatible with the specific video format available. This new information would, in a case such as this, probably eliminate the possiblity of using video as an instructional medium. Previously made decisions would have to be changed. Whatever video support materials had been produced thus far (e.g., student workbooks, instructor's manuals, props for videotaping, scripts, etc.) would have to be either modified for use with some other medium (if possible) or abandoned altogther. An open-systems ID model must also provide for the inclusion of specialized functions which could be subsumed under more generically titled phases or steps. Thus, a step which specifies the development of learner evaluation instruments (tests) would actually be comprised of several or many more specialized "sub-steps." Also, an open-systems ID model should take into account the differentiation of other systems. Thus, personnel who are initially involved in a particular instructional development project may not be sufficient in terms of specialized expertise to successfully complete the project. It may be necessary to "input" the needed expertise from the environment. The open-systems model of instructional development must allow for this contingency.

Integration:

The counter-force to differentiation is integration, by which system processes are functionally unified. Integration is defined by Katz and Kahn (1978) as "the achievement of unification through shared norms and values" (p. 30). An open-systems model of instructional development must provide for this unification in at least two ways. First, the "management subsystem" must clearly establish procedures for the various subsystems to contribute torward achievement of the goals of the instructional system. The system goals provide a focal point for integrating the various functional sub-systems. Thus, precise specification of the goals and objectives of the system, and the objectives of each functionally defined subsystem, takes on tremendous importance. An open-systems model of instructional development, therefore, should clearly define these objectives. The reason for the inclusion of any step in the ID process should be explicit and justified. The contribution of each step or component toward the achievement of the goals and objectives of the instructional system as a whole should be readily established. The second way in which an open-systems ID model must provide for functional unification is through a logical and efficient structuring and sequencing of the steps in the instructional development process. In order for the system to achieve its goals and objectives, such optimal structure and sequence is highly desirable -- if not essential. Steps having similar or directly interdependent functions would, in most cases, be placed in close proximity to one another. Certain steps provide direct input for other steps, necessitating an appropriate sequence. An open-systems model of instructional development should reflect careful attention to these considerations.

Equifinality:

The final key open-systems characteristic listed by Katz and Kahn (1978) is equifinality. The principle of equifinality states that a system can attain the same final goal by different paths and from different initial conditions. An open-systems model of instructional development, therefore, must provide a certain degree of flexibility in terms of the alternate sequences which may be followed in progressing through the ID process. Obviously, a random sequence would not be appropriate. However, more than one "path" must be available. Furthermore, such a model must also allow for entering the instructional development process from more than one acceptable starting point. While a graphic representation of this capability would be difficult at best, the user of the model should be made aware that such capability does exist.

In summary, therefore, the key characteristics involved in a conceptual model of instructional development are as follows:

1. Input of Energy
2. Conversion of Energy (Throughput)
3. Output of Energy
4. Dynamic Interaction
5. Negentropy
6. Feedback Processes
7. Steady State
8. Differentiation
9. Integration
10. Equifinality

These key characteristics of open-systems provide a useful set of criteria for evaluating a model of instructional development. If the model does indeed meet these criteria, it may be considered to be an open systems ID model. This study now focuses on an operational open-systems model of instructional development which may be applied in both educational and non-educational organizations. This operational model, in order to truly reflect an open-systems perspective of the ID process, must exhibit the ten aforementioned open-systems characteristics (Katz and Kahn, 1978). Evaluators of the proposed operational ID model, therefore, must be cognizant not only of the model's applicability in both education and business environments, but also of its adherence to the characteristics of an open system.

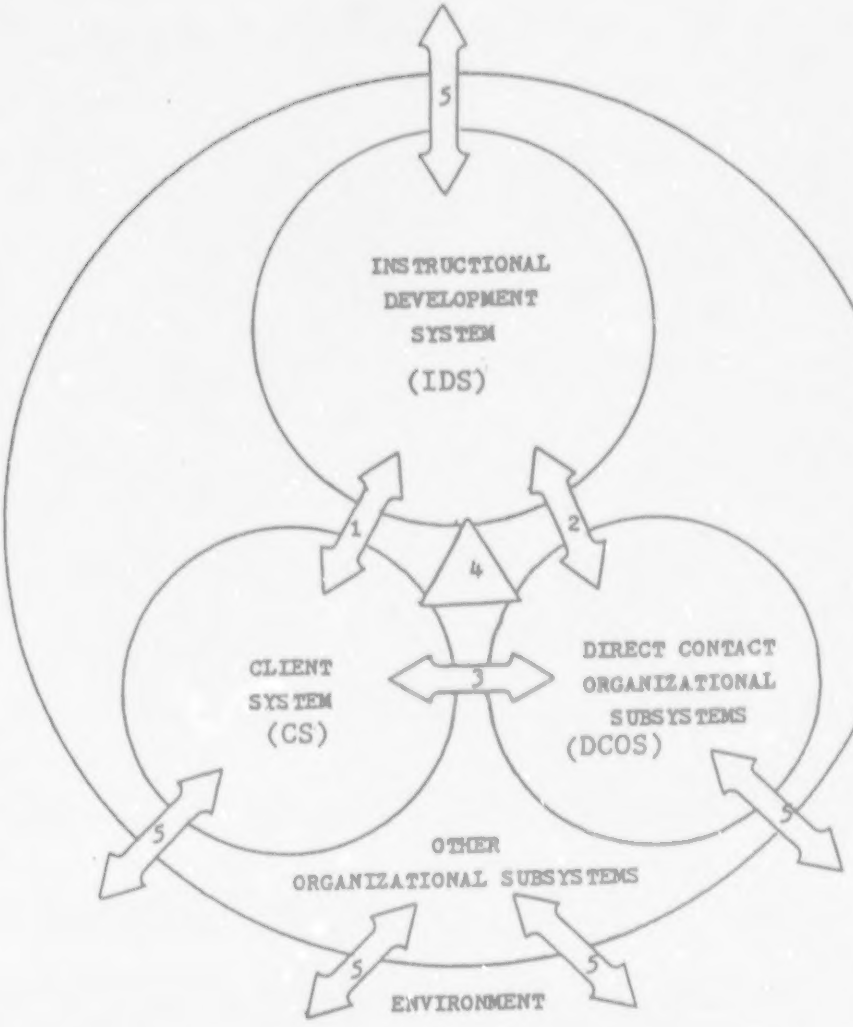
The Operational Model

An open system, by definition, interacts with other systems. An open-systems model of instructional development must, therefore, provide for this interaction and maximize its contribution toward achievement of the goals of the instructional system.

Figure 18 graphically represents the various systems interactions which may take place in the process of developing instruction. The above figure represents a situation in which the instructional development system (IDS) and the client system (CS) exist in the same organization. As such, the instructional developer (and the IDS) would be acting in the role of "internal consultant" to the client system (CS). This relationship will be an underlying assumption of the proposed model in this present study.

From the perspective of the instructional development system (IDS), various interactions are possible and, more often than not, vital to the development of effective instructional systems. The IDS must certainly interact with the client system (CS), since this interaction constitutes the consulting relationship. The IDS may also interact directly with other organizational subsystems in order to elicit support, disseminate information, receive information (or direction), and for various other purposes.

Figure 18. SYSTEMS INTERFACE IN INSTRUCTIONAL DEVELOPMENT



1 = Direct interface between IDS and CS
2 = Direct interface between IDS and Direct Contact Organizational Subsystems
3 = Direct interface between CS and Direct Contact Organizational Subsystems
4 = Direct interface among IDS, CS and Direct Contact Organizational Subsystems (may also include Environment)
5 = Interface with Environment

The IDS may also interact directly with the organization's environment for many reasons. For example, in attempting to collect instructional materials (or ideas for materials), the instructional developer may wish to research similiar instructional programs in other organizations, or to review commercially produced instructional packages. The IDS, CS and other organizational subsystems may have occasion to interact together at the same time. For example, a meeting may be held concerning the production of graphic instructional aids at which the instructional development system, client system, and the organization's graphics department may be represented.

The client system (CS) and other subsystems in the organization, of course, have similar interactive potential.

The proposed operational open-systems model of instructional development is "divided" into three major phases as follows:

Phase I. Analysis/Organization
Phase II. Development
Phase III. Evaluation/Revision

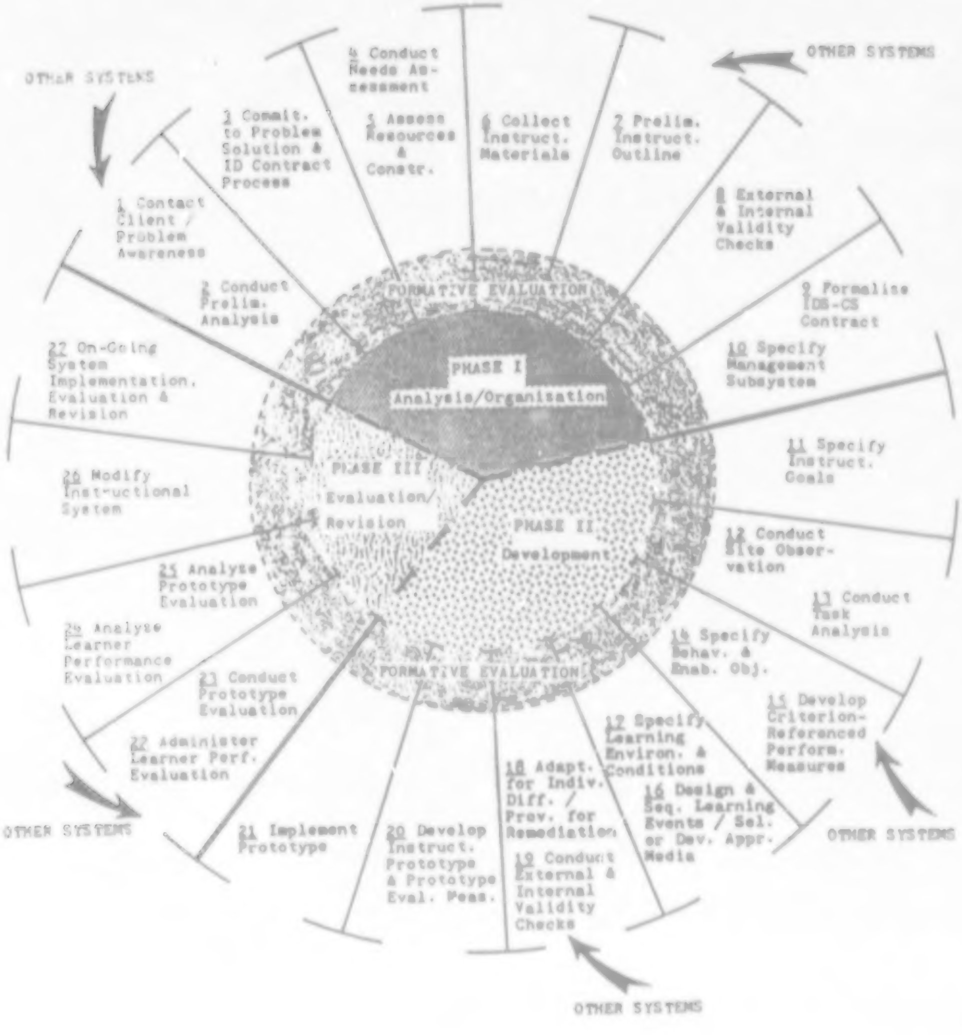
A list of the steps in the model is provided in Table 31.

The operational model is graphically depicted in Figure 19. The reader's attention is particularly directed to the "openness" of the model. The broken

Table 31. STEPS IN THE OPEN-SYSTEMS MODEL OF INSTRUCTIONAL DEVELOPMENT (SULLIVAN)

1.	Contact Client / Problem Awareness	PHASE I Analysis/Organization
2.	Conduct Preliminary Assessment	
3.	Obtain Commitment to Problem Solutuion and to ID Contracting Process	
4.	Conduct Needs Assessment	
5.	Assess Resources and Constraints	
6.	Collect Instructional Materials	
7.	Draft Preliminary Instructional Outline	
8.	Conduct External and Internal Validity Checks	
9.	Formalize Instructional Development System (IDS) -- Client System (CS) Contract	
10.	Specify Management Subsystem	
11.	Specify Instructional Goals	PHASE II Development
12.	Conduct Site Observation	
13.	Conduct Task Analysis	
14.	Specify Behavioral and Enabling Objectives	
15.	Develop Criterion-Referenced Performance Measures	
16.	Design and Sequence Learning Events / Select or Develop Appropriate Media	
17.	Specify Learning Environment(s) and Conditions	
18.	Determine Adaptations for Individual Differences / Provisions for Remediation	
19.	Conduct External and Internal Validity Checks	
20.	Develop Instructional Prototype and Prototype Evaluation Measures	
21.	Implement Prototype	
22.	Administer Learner Performance Evaluation	PHASE III Evaluation/Revision
23.	Conduct Prototype Evaluation	
24.	Analyze Results of Learner Performance Evaluation	
25.	Analyze Results of Prototype Evaluation	
26.	Modify Instructional System	
27.	On-Going System Implementation, Evaluation, and Revision	

Figure 19. OPEN-SYSTEMS MODEL OF INSTRUCTIONAL DEVELOPMENT (SULLIVAN)


OTHER SYSTEMS
OTHER SYSTEMS
OTHER SYSTEMS
OTHER SYSTEMS
OTHER SYSTEMS
1 Contact Client / Problem Awareness
2 Conduct Prelim. Analysis
3 Commit. to Problem Solution & ID Contract Process
4 Conduct Needs Assessment
5 Assess Resources & Constr.
6 Collect Instruct. Materials
7 Prelim. Instruct. Outline
8 External & Internal Validity Checks
9 Formalise IDS-CS Contract
10 Specify Management Subsystem
11 Specify Instruct. Goals
12 Conduct Site Observation
13 Conduct Task Analysis
14 Specify Behav. & Enab. Obj.
15 Develop Criterion-Referenced Perform. Measures
16 Design & Seq. Learning Events / Sel. or Dev. Appr. Media
17 Specify Learning Environ. & Conditions
18 Adapt. for Indiv. Diff. / Prov. for Remediation
19 Conduct External & Internal Validity Checks
20 Develop Instruct. Prototype & Prototype Eval. Meas.
21 Implement Prototype
22 Administer Learner Perf. Evaluation
23 Conduct Prototype Evaluation
24 Analyse Learner Performance Evaluation
25 Analyse Prototype Evaluation
26 Modify Instructional System
27 On-Going System Implementation, Evaluation & Revision
FORMATIVE EVALUATION
FORMATIVE EVALUATION
PHASE I
Analysis/Organization
PHASE II
Development
PHASE III
Evaluation/Revision

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circle comprising the boundaries of the instructional system symbolizes the interdependent nature of the components (steps) of the system (model), as well as the interface between the instructional system and other systems in the environment. The circular structure of the model symbolizes the dynamic, cyclical, iterative and on-going nature of the instructional development process. Feedback loops have been eliminated, since they would be inadequate in demonstrating the fact that actions taken in any step in the process have potential impact on virtually every other step. Instead, the broken lines allow for an unrestricted information flow among all twenty-seven (27) steps, as well as information exchange between any system component (step) and the environment.

It should be noted that some steps are placed in pairs in the same sector of the model (e.g., Steps 1 & 2, Steps 4 & 5, Steps 9 & 10, etc.). When such a pairing occurs, it is the assertion of the present writer that these two steps may be conducted simultaneously, or almost simultaneously. For example, the development of criterion-referenced performance measures (Step 15) is based on the specified behavioral and enabling objectives (Step 14). Many authors state that the construction of criterion-referenced performance measures may be done concurrent with or immediately after instructional objectives are stated (Diamond, et al., 1975; Dick and Carey, 1978; Gagné and Briggs, 1979; Kemp, 1977).

For the purposes of this present study, the model will be presented phase-by-phase. The goals of the phase will be listed, followed by the objectives of each step in that phase and a brief dicussion of that step. Detailed explanations of "how to" carry out each step have been eliminated, since they are beyond the scope of this present study. The reader desiring such explanations is referred to some of the references provided in this study (e.g., Briggs, 1977; Diamond et al., 1975; Dick & carey, 1978; Gagné & Briggs, 1979; Kemp, 1977).

PHASE I. ANALYSIS/ORGANIZATION

Goals of Phase I:

1. Analyze and define the instructional problem to be solved.
2. Formalize the Instructional Development System (IDS) -- Client System (CS) relationship through collaborative determination of ID contract specifications.
3. Develop tentative instructional strategies for solving the instructional problem.
4. Specify ID project management functions and tasks.

The Steps in Phase I are as follows:

Step 1. Contact Client / Problem Awareness:

The objectives of Step 1 are:

a. Establish contact and rapport between the CS and the IDS.
b. Provide the IDS with an overview

of the problem so that it may be determined whether or not the problem might be solved through IDS intervention.

Usually, the client will initiate contact with the instructional development system, since it is the client who first becomes aware of the "problem" to be solved. The instructional development system (IDS) is given the client's perception of the problem. The importance of interpersonal dynamics in the initial consultant-client contact cannot be overemphasized. Unless mutual trust and rapport are established, the consulting relationship will be more difficult (and probably less effective) throughout the entire ID process. As the client discusses his/her perception of the problem, the instructional developer should begin to consider whether or not the problem can be "solved" by instructional means.

Thus far, the task of the instructional developer has been to listen carefully to the client and to begin to conceptualize the nature of the problem.

Step 2. Conduct Preliminary Analysis

The objectives of Step 2 are:

a. Define the nature and scope of the problem.
b. Decide whether or not sufficient grounds exist to continue the ID process.
c. Develop a tentative list of project goals.
d. Establish tentative time lines for

project completion.

e. Check the impact of this step on the previous step and take necessary actions.

As the instructional developer begins to conceptualize the problem, she/he begins to ask more questions in order to clarify understanding. Usually, this will begin to occur at the initial meeting with the client. Hence, Steps 1 & 2 have been "paired" in the model. As the nature and scope of the problem become more clearly defined, the developer may have enough information to decide whether or not instructional development process intervention is warranted. For example, what may have initially been proposed by the client as an instructional problem may, in fact, be due to ineffective management or poor communication within the client system. In this case, the developer may wish to suggest that the client (perhaps with the developer's help) investigate other types of solutions that would more properly fit the problem (e.g., some form of organizational development intervention or an investigation of communication patterns in the client system). However, if the problem is instructional, then discussion may proceed to some tentative goals of the needed instruction and a preliminary set of time lines (or target dates) for completion of the instruction. The necessity of properly differentiating among various needs of the organization was strongly supported by the survey data. The combined (Business and Education) response group indicated that this behavior (item 11) should be practiced 86.6% of the time (mean response as indicated in Table 26). Thus far, the only information exchanged has been between client and instructional developer.

Step 3. Obtain Commitment to Problem Solution and to ID Contracting Process:

The Objectives of Step 3 are:

a. Obtain the commitment of both the IDS and CS to solve the instructional problem.
b. Inform the CS about the ID model and the ID contracting process.
c. Obtain the commitment of both the IDS and CS to formulate a mutually-acceptable, written contract emcompassing all phases of the ID process.
d. Check the impact of this step on all previous steps and take necessary actions.

Before attempting to proceed any further, it is necessary to be sure that both the client and the developer are "ready, willing and able" to solve the problem. If such is the case, then both parties should express their commitment at this time to a problem solution. However, it must be a sincere, confident and firm commitment. If one or both of the parties are not "ready," "willing" or "able" to make such a commitment, further discussion or a waiting period is called for. If both parties can and do make such a commitment, the developer should ascertain whether or not the client is familiar with the ID model. If not, the developer should carefully explain the model to the client. If the client is already familiar with the model, the developer may wish to reaffirm this understanding as a precaution against future misunderstanding or disagreement. It is very important that the client understand the ID process, since the client may devote much time, energy and resources to the process. Also, taking the time now to agree upon the steps to be taken later in developing the instruction will prevent many misunderstandings, delays and conflicts.

One of the unique features of this proposed model is that the steps of the model are also meant to comprise the elements of the contract between the instructional development system (IDS) and the client system (CS). If the client understands and agrees to the model, there should be few problems with the IDS-CS contract, since the two are essentially the same. Both parties, them, should agree to formulate this contract. This contract should be written, should be mutually-acceptable, and should be open to renegotiation at any time. The parties should not attempt to write the contract at this time, since much needed information is yet to be obtained. However, each party should feel free to begin taking notes regarding desired points in the contract for future reference (especially in Steps 9 & 10).

As with all steps in the model, the user should make a conscious and careful effort to ascertain the impact of the decisions made, information obtained or actions taken in this step which might affect those of other steps in the model. Although the present writer will not re-emphasize this point at every step in the model, the point is absolutely vital for the user of this model to remember.

Step 4. Conduct Needs Assessment:

The Objectives of Step 4 are:

a. Obtain data from both within the organization and, if necessary, outside the organization regarding any "gaps" between the status quo and the desired state of the CS.
b. Analyze this data according to agreed-upon procedures (statistical and/or logical) in order to maximize understanding of the instructional problem.
c. Specify the scope of instruction in terms of:
    1) the number of learners in the target population
    2) the approximate length of time needed for a learner to complete the instruction.
    3) the entry level specifications required.
d. Check the impact of this step on all previous steps and take necessary actions.

At this point, the client and developer should be ready to specify the discrepancies or "gaps" between the current state of the client system (re: skills, knowledge, or attitudes which exist) and the desired state. These discrepancies may be expressed in terms of the "needs" to be fulfilled through instruction. The underlying assumptions, of course, are that the status quo must be changed to more closely conform to the desired state, and that instruction is to be implemented to facilitate such change. The status quo must be measured with as great a degree of reliability and validity as possible. Data may be gathered by surveys, interviews, audits and other "quantifiable" means. At other times, however, such measures may not be possible. The data may be gathered from sources within the organization (or even within the client system), or may be extended to sources in the environment. The data may be analyzed through sophisticated statistical procedures, or may be interpreted through a process of logical inference and deduction. The objective, regardless of the specific means employed, is to obtain and analyze sufficient data to enable the instructional needs of the client system to be clearly specified.

The specification of instructional needs should include clarification of the scope of the needed instruction. How many learners are to be targeted for instruction? How long will the learner require to complete the instruction? In other words, how much instruction is needed: a one-hour "mini lesson"? a two-day module? a two-month course? a two-year curriculum?

Also, the learner entry level specifications should be determined at this point. Basically, these specifications are of two types (or levels): the general characteristics of the target population (e.g., demographic data, ability levels, etc.) and the specific entry behaviors expected of the learners in the target population (e.g., specific skills, knowledge or attitudes possessed prior to beginning the proposed instruction). It should be noted that specific entry behaviors might only be tentatively identified at this point, depending on the outcomes of the Task Analysis (Step 13). Mean responses of the combined (Business and Education) response group, as indicated in Table 26, support these behaviors. Ideally, needs should be systematically analyzed (item 4: $\bar{x}$ = 88.5%) entry levels specified (item 6: $\bar{x}$ = 89.3%), and the scope of instruction determined (item 8: $\bar{x}$ = 91.7%).

Step 5. Assess Resources and Constraints:

The Objectives of Step 5 are:

a. List all resources which are available to the project.
b. List all significant constraints which could restrict the progress of the project.
c. Devise strategies for maximizing the available resources and for minimizing the impact of constraints of the project.
d. Check the impact of this step on all previous steps and take

necessary actions.

No matter how great the need for instruction, the instructional development process will be doomed to almost certain failure unless sufficient resources are made available for the particular "ID project" proposed. This determination of available resources and potential constraints should be made at this point in the process, since specification of the client's needs will provide necessary input as to the resources required. The combined group of Business and Education respondents indicate that this assessment should be carried out 89% of the time (mean response for item 11 in Table 26), thus providing strong justification for its inclusion in this proposed model. One technique that may prove useful at this point is Force Field Analysis (Lewin, 1951). Available resources should be maximized, while strategies are developed and implemented for reducing the impact of constraints on the project. Careful attention to Steps 4 (Needs Assessment) and 5 (Assessment of Resources and Constraints) will provide valuable data on the feasibility of continuing the ID project as defined thus far.

Step 6. Collect Instructional Materials:

The Objectives of Step 6 are:

a. Analyze existing instructional materials, courses, etc. for relevent materials and ideas.

b. Check the impact of this step on all previous steps and take necessary actions.

At this point, it is possible to begin to collect relevent materials and ideas for the proposed instruction. This activity is actually likely to continue until much later in the ID process. The developer will want to carefully examine currently offered courses, modules and "isolated" materials. Sometimes, materials are found which fulfill some of the requirements for the proposed instruction. Sometimes, these materials need only slight modification (at relatively little expense). Even if currently owned materials are not themselves useable (even in modified form), they may provide valuable ideas for the design or purchase of new materials. After currently-owned materials have been examined, the search for other useful materials and ideas can begin. Support for this step was expressed by Business and Education survey respondents, who indicated that it should be carried out 90.5% of the time (mean response to item 10 in Table 26).

Step 7. Draft Preliminary Instructional Outline:

The Objectives of Step 7 are:

a. Write a tentative outline of the proposed instruction.
b. Specify tentative instructional goals.
c. Specify tentative behavioral and enabling objectives.

d. Check the impact of this step on all previous steps and take necessary actions.

By this time, the developer should have a fairly good idea of what the overall plan for the instruction will be. It should be possible for the developer to draft a tentative outline of the proposed instruction, to specify tentative instructional goals, behavioral objectives and enabling objectives. These drafts should represent the developer's "best educated guess" of these components, based on everything learned thus far. The importances of this step was confirmed by a mean response of 89.7% of the combined (Business and Education) response group on item 5, as indicated in Table 26. This step, although often ignored, can save much wasted effort, money and other resources by providing a "check" on understanding between client and developer, and by laying necessary groundwork for later steps.

Step 8. Conduct External and Internal Validity Checks:

The Objectives of Step 8 are:

a. Obtain, analyze and utilize input regarding content validity of the proposed instruction from personnel within the IDS and CS.
b. Obtain, analyze and utilize input regarding content validity of the proposed instruction from subject matter experts (SME's) and other relevent personnel outside of the IDS or CS (if necessary).

c. Check the impact of this step on all previous steps and take necessary actions.

As yet, no objectives have been "finalized," no instructional media or materials have been designed; nothing has progressed beyond the "tentative" form. It is now time to "validate" these tentative plans. First, the client must confirm the tentative goals, objectives and outline drafted by the developer in the previous step. If changes are needed, now is the time they should be made. Second, the content validity of the proposed instruction must be assessed by whatever other relevant personnel are needed (e.g., subject matter experts, or SME's; instructional psychologists; technicians; evaluation experts; etc.). When both client and developer are satisfied that sufficient content validity is present (so far), they are ready to begin formalization of the IDS-CS Contract. When viewed as a part of the formative evaluation process, the value of this step is underscored by the combined response group (Business and Education), who indicated that formative evaluation (item 18) should be practiced 87.8% of the time (Table 26).

Step 9. Formalize IDS-CS Contract:

The Objectives of Step 9 are:

a. Write a mutually-acceptable contract between the IDS and CS which accounts for all steps in this ID model.

b. Establish a plan for periodic review and, if needed, renegotiation of this contract.
c. Check the impact of this step on all previous steps and take necessary actions.

This step and Step 10 (Specify Management Subsystem) must almost certainly be conducted simultaneously, since the IDS-CS contract components will be the steps of the instructional development model. Although the specificity of the contract will depend on the particular situation at hand, it is generally true that the more detailed the contract, the less room there is for misinterpretation. For each step, however, it should be specified what is to be done (tasks), who will do it (responsibilites), by when it should be done (time lines or deadlines), and any other necessary factors. For example, it may be desirable to also specify the methodology to be employed in certain steps (e.g., Steps 4,8,18,19,21,22,23,24,25 and 27).

Three important characteristics of the IDS-CS contract are the following:

a. The contract should be in writing.
b. The contract should be jointly formulated by the IDS and CS.
c. The contract should always be open to renegotiation.

It should be evident from these considerations that the IDS-CS contract is meant to function as a project guide, as opposed to a binding agreement between the two parties.

It should be emphasized that the ID model (and the IDS-CS contract) are primarily intended for use by the instructional developer who functions in the role of "internal consultant." While the present writer would contend that both the ID model and the proposed contracting process could be applicable in a diversity of "external ID consultant" situations, such application is not explicitly advocated.

Step 10. Specify Management Subsystem:

The Objectives of Step 10 are:

a. Specify all tasks which must be performed in order to effectively and efficiently complete the ID project.
b. Assign responsibilities for completion of these tasks.
c. Establish time lines for completion of these tasks.
d. Specify communication channels and procedures to be used in this project:

    1) within IDS
    2) between IDS and CS
    3) liaison with other systems

e. Specify responsiblities regarding funding, materials and equipment, personnel, facilities, and support services.
f. Check the impact of this step on all previous steps and take necessary actions.

The previous step (9 : Formalize IDS-CS Contract) provided for the specification of tasks, the assignment of responsiblities and the determination of time lines for completion of tasks. These activities may also be considered vital components of the Management Subsystem. Such techniques as Program Evaluation and Review Technique (PERT) and Planning-Programming-Budgeting System (PPBS) have proven useful with regard to keeping a project "on track," within the established time lines and within budget (Beishon and Peters, 1976; Briggs, 1977).

Respondents to the survey in this present study expressed support for the establishment of staff/management controls (item 25). Table 26 shows that the combined (Business and Education) response group indicated that these controls should be established 73.5% of the time.

It is absolutely imperative, especially in large-scale projects involving many people, to clearly specify the communication channels and procedures to be employed in the project. As Gustafson (1971) declares, "There is no more important element to consider when planning an ID project than designing, maintaining and redesigning the information transfer network within the system and with its external interfaces" (p. 5). The interface between the IDS and the CS is particularly important, since if each party is to be an "equal partner" in the ID process, each deserves to be provided with the information it needs to fulfill its responsibilities under the IDS-CS contract.

Also, interface with systems outside of the organization must be planned and coordinated between relevant organizational subsystems (minimally, the IDS and CS).

It is also necessary to specify responsibilities regarding who will provide funding, materials and equipment, personnel, facilities, and various required support services (e.g., typing, research, duplicating, etc.).

PHASE II. DEVELOPMENT

Goals of Phase II:

1. Specify instructional goals, objectives and performance measures.
2. Develop a validated instructional prototype.
3. Test the instructional prototype and make needed revisions prior to full-scale implementation.

The steps in Phase II are as follows:

Step 11. Specify Instructional Goals:

The Objectives of Step 11 are:

a. Specify the goals of the instructional system, based on data gathered from Phase I of the model.
b. Check the impact of this step on all previous steps and take necessary actions.

The goal(s) of the instruction should be specified in behavioral terms, since the derived objectives (to be specified later) will also be behaviorally stated. Careful attention must be given to the scope of instruction implied by the instructional goal(s). For example, course level goals would tend to set broader expectations than would goals for a smaller instructional module. The instructional goal(s) should reflect an accurate synthesis of the data obtained and analyzed in Phase I. The survey data tends to support this specification of instructional goals. The goals must be based on the needs assessment conducted in Step 4. This assessment of needs elicited a mean response for the combined (Business and Education) response group of 88.5%, as shown in Table 26. However, it should be kept in mind that future modification of the instructional goal(s) may be necessary.

Step 12. Conduct Site Observation:

The Objectives of Step 12 are:

a. Obtain first-hand information on the setting in which learners will utilize the instruction.
b. Establish direct contact between the IDS and the learner population.
c. Obtain data from direct observation and through interaction with the intended learner population which can be used to validate the proposed instruction.
d. Check the impact of this step on all previous steps and take necessary actions.

While this present writer realizes that site observation(s) may not be possible (e.g., time constraints) or necessary (i.e., for those situations with which the instructional developer is already personally familiar), such observation can be extremely beneficial to the developer for the following reasons:

1) to increase the validity of instruction by:
    a) providing personal insight into the "real life situation for which instruction is being developed
    b) receiving personal feedback from those for whom the instruction is being developed
    c) allowing personal attention to situational details which may necessitate special considerations regarding use of media, required time for instruction, etc.

2) to build rapport, credibility and confidence in the instructional developer (and IDS) on the part of the client and the target learner population.

3) to provide first-hand information for the developer for input to previous and future steps.

The survey data supports site visitations. The combined response group provided a mean response for this behavior (item 12) of 85.5%, as shown in Table 26.

Step 13. Conduct Task Analysis:

The Objectives of Step 13 are:

a. Identify performance components, which will later be specified in terms of behavioral objectives (Information-processing analysis).
b. Identify prerequisites to those performance components, which will later be specified in terms of enabling objectives (Learning task analysis).
c. Classify the types of learning required in the instruction in terms of some specified taxonomy of learning (Task classification).
d. Check the impact of this step on all previous steps and take necessary actions.

The instructional goals (identified in Step 11) must now be broken down into the relevant skills required to achieve those goals. These skills may be listed as a sequence of the individual tasks which, when completed, result in some desired performance. Through observation, research or the input of subject matter experts, the developer may identify prerequisite skills or knowledge which is necessary for the performance of a desired behavior. If a site observation (or observations) is conducted, it may be possible during that observation to analyze the requisite tasks for which instruction must be developed. According to the combined (Business and Education) response group in the survey employed in this present study, a task analysis should be conducted 69.8% of the time (item 14 in Table 26). Since a detailed description of this step is well beyond the scope of this present discussion, the reader may wish to consult other sources regarding the procedures involved in conducting a task analysis (e.g., Dick & Carey, 1978; Gagné & Briggs, 1979). Basically, the task analysis will provide the data necessary to specify instructional objectives in the next step. In situations where the instructional developer is not already familiar with the content of the proposed instruction, it will often be necessary for the developer and the client (and possibly others) to work together very closely in conducting the task analysis. This possibility should be anticipated and provided for as early as possible in the ID process.

Step 14. Specify Behavioral and Enabling Objectives:

The Objectives of Step 14 are:

a. Specify behavioral objectives which clearly state what learners should be able to do upon completion of the instruction.
b. Specify enabling objectives which clearly state the prerequisities for each behavioral objective.
c. Check the impact of this step on all previous steps and take necessary actions.

Various authors disagree as to the specific components of instructional objectives. Kemp (1977) favors including a performance standard (criterion) for behavioral and enabling objectives; while Gagné & Briggs (1979) submit that performance criteria should not be included in objective statements, since establishing these criteria is more appropriately done when constructing evaluation measures. The present writer takes the position that performance criteria can be included in the behavioral and enabling objectives -- if the following three conditions are present:

1) the instructional developer feels confident that he/she knows what the performance criterion should be for a particular objective, and
2) the particular objective lends itself to quantifiable measurement, and
3) the performance criterion for that objective is not likely to change.

The inclusion of performance criteria in the statement of instructional (behavioral and enabling) objectives, therefore, is a decision left up to the individual developer. However, all instructional objectives must be stated in terms of what the learner will be able to do after completing the instruction. Such learner behaviors must be both observable and measurable. Instructional developers would be well advised to take the time and effort to write instructional objectives which are clear, specific, realistic, valid, observable and measurable. Behavioral and enabling objectives, a-cording to the combined (Business and Education) response group in the survey employed in this present study, should be specified 89.7% of the time (item 13 in Table 26). These objectives, if properly stated, serve several key functions. They should be used:

1) as the basis for constructing criterion-referenced performance measures
2) as a guide in selecting the content, delivery techniques and other aspects of instruction

Objectives may also be used:

3) as a guide for students in providing a conceptual framework for the instruction.
4) as a means of establishing a common reference point between the instructional developer and the client and between an instructor and learneers regarding the relevance of instructional content, the results of learner evaluation, and the effectiveness of the instruction.
5) as a self-evaluation "checklist' for the learner to assess his/her own progress and to keep his/her efforts properly focused.

Step 15. Develop Criterion-Referenced Performance Measures:

The inclusion of performance criteria in the statement of instructional (behavioral and enabling) objectives, therefore, is a decision left up to the individual developer. However, all instructional objectives must be stated in terms of what the learner will be able to do after completing the instruction. Such learner behaviors must be both observable which are clear, specific, realistic, valid, observable and measurable. Behavioral and enabling objectives, according to the combined (Business and Education) response group in the survey employed in this present study, should be specified 89.7% of the time (item 13 in Table 26). These objectives, if properly stated, serve several key functions. They should be used:

1) as the basis for constructing criterion-referenced performance measures
2) as a guide in selecting the content, delivery techniques and other aspects of instruction

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4) as a means of establishing a common reference point between the instructional developer and the client and between an instructor and learners regarding the relevance of instructional content, the results of learner evaluation, and the effectiveness of the instruction.
5) as a self-evaluation "checklist" for the learner to assess his/her own progress and to keep his/her efforts properly focused.

Step 15. Develop Criterion-Referenced Performance Measures:

The Objectives of Step 15 are:

a. Develop evaluation instruments which evaluate the learner's achievement of the behavioral and enabling objectives according to an appropriate criterion level.
b. Check the impact of this step on all previous steps and take necessary actions.

Learners should be evaluated in relation to the specific objectives established in the previous step. Criterion-referenced evaluation of learners is supported by the survey data of this present study, the combined (Business and Education) response group indicating that learner evaluation should be criterion-referenced 87% of the time (item 21 in Table 26). If performance criteria have not been specified in the instructional objectives, these criteria must be determined when constructing the evaluation measures. As with most steps in this proposed model, a detailed discussion of "how to" carry out the step is beyond the scope of this study. However, a few brief comments are needed. First, the developer should be sure that all items on a criterion-referenced test correspond to an instructional objective. If any given objective is not evaluated, the developer may want to question the necessity of including the objective. Likewise, if a given test item does not "match" any particular instructional objective, the validity of that test item should be questioned. Second, it should be noted that

Steps 14 (Specify Behavioral and Enabling Objectives) and 15 (Develop Criterion-Referenced Performance Measures) can be conducted almost simultaneously. Whether the developer chooses to specify all instructional objectives before developing the criterion-referenced tests (performance measures), or to construct tentative test items for objectives as the objectives are specified, is a matter of preference. However, the present writer would advocate drafting test items as soon as the developer feels that she/he has clearly specified the instructional objectives. The effort expended in the statement of specific objectives can provide the "momentum" needed to write matching criterion-referenced test items. The disciplined "frame of mind" necessary to write good instructional objectives is also needed to construct good test items.

Step 16. Design and Sequence Learning Events/Select or Develop Appropriate Media:

The Objectives of Step 16 are:

a. Design instructional materials which facilitate achievement of the previously specified instructional goals and objectives.
b. Select existing media or develop media which appropriately and effectively either support other instructional material (instructional aids) or directly deliver the instruction to the learners (instructional media).
c. Design effective learning events which provide for effective delivery of instruction.

d. Sequence these learning events in a logical order so as to most effectively address the objectives of the instruction.
e. Check the impact of this step on all previous steps and take necessary actions.

Based on the task analysis (Step 13) and the specified behavioral and enabling objectives (Step 14), the design of instructional materials may begin. The developer may also wish to search existing materials once again (as in Step 6) for possible use or modification. The instructional objectives will also provide the basis for deciding what instructional strategies would be most effective. For example, decisions must be made regarding the preinstructional activities, method(s) of delivery, provisions for learner participation and follow-up activities which would most effectively facilitate learning (e.g., see Dick & Carey, 1978, Chapters 7 & 8). Media must be selected or developed with the same objectives in mind. The combined (Business and Education) response group for the survey in this present study supported the selection of media based on the objectives of the instruction, indicating that such selection should be made 94.5% of the time (item 9 in Table 26).

Although this is listed as a discrete step, it should be noted that the design and sequencing of learning events, and the selection and/or development of appropriate media will be extremely time consuming. The tasks involved in this step are likely to require effort well into the future of the ID process.

Step 17. Specify Learning Environment(s) and Conditions:

The Objectives of Step 17 are:

a. Specify for each learning event the environment(s) and attendant conditions under which the learning should take place.
b. Check the impact of this step on all previous steps and take necessary actions.

Concurrent with the design and sequencing of learning events and the selection and/or development of media, it is necessary to determine the optimal environment(s) and conditions under which learning should take place. The survey data of this present study bears out this assertion. The combined (Business and Education) response group indicated that the selection of the learning environment(s) should be based on the objectives of instruction 89.4% of the time (item 24 in Table 26). While previously determined constraints (Step 5) will limit the developer's options in many cases, he/she should consider the full range of available options, keeping in mind that the selection of learning environments must be based as much as possible on facilitating achievement of the instructional objectives. The planned learning events, the requirements of the proposed media, the various characteristics of the learner population, the availability of facilities and support services, and budgetary factors are all considerations which must be made in selecting learning environments and conditions.

Step 18. Determine Adaptations for Individual Differences/Provisions for Remediation:

The Objectives of Step 18 are:

a. Specify what adaptations in the instruction (if any) will be made to allow for individual differences among learners.
b. Specify what provisions in the instruction (if any) will be made to offer remedial instruction for those learners who either need or request it.
c. Check the impact of this step on all previous steps and take necessary actions.

In actual practice, provisions for individual differences among learners and for remediation are often impractical -- and sometimes impossible -- given the constraints involved. While most developers would agree that these provisions are highly desirable, they would also agree that such provisions are seldom made. Assuming, however, that provisions for individualization and/or remediation are both desirable and practical, it would be at this point in the ID process that such provisions could be determined. The combined (Business and Education) response group for the survey in this present study supported both adaption for individual differences (item 17) and provisions for remediation (item 15) under "ideal circumstances" with mean responses of 83.4% and 79.7%, respectively. If the instruction is to be completely individualized, planning must begin at an even earlier step, probably as early as the initial discussions with the client (Steps 1 & 2).

Step 19. Conduct External and Internal Validity Checks:

The Objectives of Step 19 are:

a. Obtain, analyze and utilize input regarding content validity of instructional materials from subject matter experts (SME's) and other relevant personnel outside of the IDS and CS (if necessary).
b. Obtain, analyze and utilize input regarding content validity of instructional materials from personnel within the IDS and CS.
c. Check the impact of this step on all previous steps and take necessary actions.

Just as the content validity of "tentative" instructional plans and materials was assessed (Step 8) before objectives were specified and before materials and media were designed, so too should the content validity of the actual objectives, materials and media be assessed. This validation need not wait until all materials and media are in their "final" form. Rather, it may take place as soon as they have been developed to the point where it is felt that the content will not significantly change. The assumption on the part of the developer (and client) should be that changes will be needed. This validation may be conducted concurrently with Step 18 (Determine Adaptations for Individual Differences/Provisions for Remediation) and should be completed prior to development of the instructional prototype (Step 20). Although Steps 8 and 19 (re: content validation) are listed as discrete steps, they are part of the formative evaluation of the instruction. Therefore, the validation of instruction should actually be an on-going activity which receives at least some attention throughout the instructional development process. Like its earlier counterpart in Phase I (Step 8), this step is part of the process of formative evaluation of instruction. As such, its value is confirmed by the mean response to item 18 (re: formative evaluation) of the survey in this present study. The combined (Business and Education) response group indicated that formative evaluation should be practiced 87.8% of the time (Table 26).

Step 20. Develop Instructional Prototype and Prototype Evaluation Measures:

The Objectives of Step 20 are:

a. Produce a prototype of the instructional system which includes the following components:
   1) instructional goals and objectives
   2) criterion-referenced performance measures
   3) all instructional materials and media in as near to final form as possible
   4) all instructor guides and administrative materials

5) specifications for evaluating all components of the instructional prototype

b. Check the impact of this step on all previous steps and take necessary actions.

After assessing the content validity of the instruction, an instructional "prototype" should be developed. All instructional materials, media and support materials (e.g., instructor's guide) should be produced in a form that is as close as possible to the "final form." Specifications for evaluating all components of the prototype should also be determined. The evaluation of the instructional prototype should also be determined. The evaluation of the instructional prototype represents summative evaluation of instruction. Summative evaluation was strongly advocated by the combined response group for the survey in this present study. A mean response of 95.8% was provided for item 19 (re: summative evaluation) as shown in Table 26.

Step 21. Implement Prototype

The Objectives of Step 21 are:

a. Implement the instructional prototype with a representative sample of the target learner population under conditions which are as similar as possible to those which will prevail during later, full-scale implementation.

b. Check the impact of this step on all previous steps and take necessary actions.

Implementation of the prototype will provide the data needed to make needed changes in the instruction before it is implemented on a full-scale. By testing the instruction with a representative sample of the target learner population, the developer receives input regarding the effectiveness of the instruction from the learners themselves. This type of evaluation of the instruction is often referred to as "formative evaluation." The present model, however, has also included other sources of input for this formative evaluation, besides the learners themselves. Thus far, input has been obtained from the client (Steps 7,8,12,13, and 19) and other relevant "experts" (Steps 8,12 and 19). At this point, input from the intended learners is needed.

Formative evaluation of instruction may involve several steps or levels. They are:

1. One-to-one evaluation, in which the developer may select one or more learners and work through the instruction with them individually.
2. Small-Group evaluation, in which the developer works with a group of approximately ten (10) to twenty (20) learners who are representative of the target learner population.
3. Field evaluation, in which the prototype is tested with approximately thirty (30) or more learners.

Phase III. EVALUATION/REVISION

Goals of Phase III.

1. Obtain, analyze and utilize data in making necessary modifications in the instructional system.

2. Provide for the implementation, evaluation and revision of the instructional system on an on-going basis.

The Steps in Phase III are as follows:

Step 22. Administer Learner Performance Evaluation

The Objectives of Step 22 are:

a. Obtain data on the extent to which the objectives of the instruction were achieved.
b. Check the impact of this step on all previous steps and take necessary actions.

Although Steps 22 (Administer Learner Performance Evaluation), and 23 (Conduct Prototype Evaluation) are listed as discrete steps, these evaluations may be conducted concurrently with the implementation of the prototype (Step 21), depending on the particular situation at hand. Step 22 is specifically intended to obtain direct feedback from learners regarding the extent to which the objectives of the instruction were actually achieved. Testing learners was supported by the survey data in this present study. The combined (Business and Education) response group indicated that learner achievement should be evaluated 89.6% of the time (item 16 in Table 26). While one source of this input will consist of the results of these tests, many authors (e.g., Dick & Carey, 1978; Gagné & Briggs, 1979) advocate the use of questionnaires and/or discussions with learners and others to obtain their direct feedback on various aspects of the instruction. This direct feedback is elicited in the next step.

Step 23. Conduct Prototype Evaluation:

The Objectives of Step 23 are:

a. Obtain data (according to the specifications established in Step 20) on the effectiveness of all components of the instructional prototype from the following sources:
    1) learners
    2) instructors
    3) members of the IDS
    4) members of the CS
    5) any other relevent personnel (e.g., SME's, evaluation specialists, media specialists, etc.)

b. Check the impact of this step on all previous steps and take necessary actions.

While the developer must certainly interact with and obtain feedback from learners in the formative evaluation of instruction, it is valuable to also include other personnel (when possible) who have a vested interest in the effectiveness of the total instructional system. The instructors who will be implementing the instruction on a full-scale should be involved. They may even implement the instructional prototype, with the developer acting in an observer/consultant role. Other members of the IDS, the CS, and any other relevant personnel may also be involved. Making decisions about the instruction using an open-systems perspective necessitates utilization of all relevant and available resources.

Instructors, for example, might be asked about any practical difficulties they encountered in delivering the instruction. Were the instructional materials well constructed and logically sequenced? Were the times assigned for the various "pieces" of instruction adequate? Was learner interest easily gained and held? Were there any other administrative or procedural problems? These are the kinds of questions which could be asked of the instructors.

Dick and Carey (1978) propose asking the following questions of learners:

> 1) Was the instruction interesting?
> 2) Did you understand what you were supposed to learn?
> 3) Were the materials directly related to the stated objectives?
> 4) Were sufficient practice exercises included?
> 5) Were practice exercises appropriate?
> 6) Did the tests really measure your performance on the stated objectives?
> 7) Did you receive sufficient feedback on your practice exercise?
> 8) Did you receive sufficient feedback on your test results?
> 9) Were enrichment or remedial materials satisfactory? (pp. 161-162)

Eliciting the direct input of learners regarding the effectiveness of instruction was upheld in the survey data of this present study. The combined (Business and Education) response group indicated that such input should be elicited 95.1% of the time (item 22 in Table 26).

Step 24. Analyze Results of Learner Performance Evaluation:

The Objectives of Step 24 are:

a. Assess the validity of the criterion-referenced evaluation instruments.
b. Assess the reliability of these instruments.
c. Assess the administrative practicality of these instruments.
d. Suggest modifications of the evaluation instruments and administrative procedures based on the above analyses.
e. Check the impact of this step on all previous steps and take necessary actions.

Based on the data obtained in Steps 22 (Administer Learner Performance Evaluation) and 23 (Conduct Prototype Evaluation), the results of the criterion-referenced evaluation may be analyzed in terms of their validity, reliability and administrative practicality. While discussion of the procedures involved is well beyond the scope of the present study, there is a variety of useful sources that addresses these procedures in detail (e.g., Bruning & Kintz, 1977; Chase, 1976; Ferguson, 1976; Triola, 1980). From these procedures, a list of suggested modifications of the evaluation instruments and administrative procedures may be compiled. As part of the process of formative evaluation, this step is strongly supported by the survey data, as is the next step (i.e., Analyze Results of Prototype Evaluation). The combined (Business and Education) response group indicated that formative evaluation of instruction should be conducted 87.8% of the time (item 18 in Table 26).

Step 25. Analyze Results of Prototype Evaluation:

The Objectives of Step 25 are:

a. Analyze the data collected in Step 23.
b. Suggest modifications in the components of the prototype instructional system based on this analysis.
c. Check the impact of this step on all previous steps and take necessary actions.

Concurrent with or soon after the results of the learner performance evaluation (Step 24), the evaluation of the instructional prototype as a whole may be analyzed. All the data collected in Step 23 (Conduct Prototype Evaluation) may now be analyzed. Based on this analysis, modifications in the prototype are suggested.

Step 26. Modify Instructional System:

The Objectives of Step 26 are:

a. Make the modifications indicated by the analyses conducted in Steps 24 and 25.
b. Obtain, analyze and utilize any other data which would assist in improving the instructional system.

Based on the suggestions for modification of the instructional system prototype generated in Steps 24 (Analyze Results of Learner Performance Evaluation) and 25 (Analyze Results of Prototype Evaluation), the suggested modifications are now made. The value of these modifications, the result of the summative evaluation of instruction, was substantiated by the survey data of this present study. The combined (Business and Education) response group indicated that summative evaluation should be conducted 95.8% of the time (item 19 in Table 26). The developer (and other relevant personnel) must feel that, after these modifications have been made, the instructional system will be ready for full-scale implementation. If this confidence is not present, the developer may suggest further testing of the instructional system. This could involve "re-cycling" back to any of a number of previous steps in the ID model, depending on the nature and severity of the problems which still exist.

Step 27. On-Going System Implementation Evaluation and Revision:

The Objectives of Step 27 are:

a. Implement the instructional system on a full-scale.
b. Provide for continual evaluation and revision of the instructional system.
c. Provide for periodic assessment of the need for the instructional system.

Even after all previous steps have been conducted and the instruction is implemented on a full-scale, the ID process is not "finished." Since changes will always occur in the needs of the client, the learners, the various organizational subsystems (including the IDS and CS), and the environment, the instructional system must be open to continual evaluation and revision. This evaluation and revision of the entire instructional system was substantiated by the survey data. The combined (Business and Education) response group indicated that such revision should be conducted 96% of the time (item 20 in Table 26). In addition, the actual need for the instructional system must be periodically questioned. The developer (and user) of any instructional system must constantly work to assure its relevance, but must also accept its eventual obsolescence.

Based upon the literature reviewed in this present study and upon the findings of the survey of instructional development practices, this writer has proposed the integrative open-systems model of instructional development described in this chapter. It is hoped that this model will, indeed, provide a common framework for instructional development professionals in academia and business.

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APPENDIX A

A SYSTEMS GLOSSARY

adaptiveness	- the ability of a system to modify itself or its environment when either has changed to the systems disadvantage so as to regain at least some of its efficiency. (Ackoff, 1971, p.110)
boundaries	- the demarcation lines or regions for the definition of appropriate system activity, for admission of members into the system, and for other imports into the system. (Katz and Rosenzweig, 1970, p.21)
closed system	- a system which is totally isolated from and independent of its environment; it is static, predictable, and ultimately tends toward a state of equilibrium, stillness, inactivity. (from Davies, 1976, p.281)
component	- see "subsystem"
constraint	- something which holds back or prevents something else from happening (from Webster's, 1980, p. 305)
cybernetics	- the theory of complex interlocking "chains of causation," from which goal-seeking and self-controlling forms of behavior emerge. (Rapoport and Horvath, 1959, p.75)
equifinality	- a property of open systems whereby the same final state may be reached from different initial conditions and in different ways. (from Bertalanffy, 1968, p. 40)
entropy	- the tendency for any closed system to move toward a chaotic or random state in which there is no further potential for energy transformation or work. (Kast and Rosenzweig, 1970, p.19)

environment (of a system)	- a set of elements and their relevant properties, which elements are not part of the system but a change in any of which can produce a change in the state of the system. (Ackoff, 1971, p. 106)
feedback	- the property of certain systems that a portion of their outputs or behaviors is fed back to the input to affect succeeding outputs. (Hall and Fagen, 1956, p. 87)
holism	- the view that all systems -- physical, biological, and social -- are composed of interrelated subsystems. This whole is not just the sum of the parts, but the system itself can be explained only as a totality ... The holistic view is basic to the systems approach. (Kast and Rosenweig, 1970, p. 17)
input	- any energy, information or material which enters a system. (from Webster's, 1980, p. 727)
isomorphism	- a one-to-one correspondence between objects which preserves the relationships between the objects (Hall and Fagen, 1956, p. 88)
leading part (of a system)	- the element or subsystem which plays a major or dominant role in the operation of the system. (from Hall and Fagen, 1956, p. 86)
negentropy	- in open systems, the utilization of resources (material, energy, and information) imported from the environment to arrest the entropy process. (from Kast and Rosenzweig, 1970, p. 22)
open system	- a system in exchange of matter with its environment, importing and exporting energy, building up and breaking down its own component parts. Although stable, an open system is always changing, always evolving; although indentifiable, classifiable,

	it presents differences over time and in changing circumstances. (from Davies, 1976, p. 281)
operations research	- The application of the methods of science to complex problems arising in the direction and management of larger systems of men, machines, materials and money in industry, business, government, and defense. The distinctive approach is to develop a scientific model of the system, incorporating measurements of factors such as chance and risk, with which to predict and compare the outcomes of alternative decisions, strategies or controls. The purpose is to help management determine its policy and actions scientifically. (British Operational Research Society, quoted in Jenkins, 1969, p. 86)
organization	- a purposeful system that contains at least two purposeful elements which have a common purpose relative to which the system has a functional division of labor; its functionally distinct subsets can respond to each other's behavior through observation or communication; and at least one subset has a system-control function (Ackoff, 1971, p. 112)
output	- in an open system, energy of any kind generated from within the system, as a result of the system's reaction to energy input. (Davies, 1976, p. 285)
steady state	- in an open system, a state where the system remains in dynamic equilibrium through the continuous inflow of material, energy, and information. (Kast and Rosenzweig, 1970, p. 22)
subsystem	- any system that is a part of a larger system. (Webster's, 1980, p. 1420)

suprasystem - any system which contains subsystems. (from Webster's, 1980, p. 1420)

system - 1. (system as description) The structure or organization of any orderly whole, clearly showing the interrelationships of the parts to each other and to the whole itself. (Silvern)

2. (system as process) A process which synthesizes and interrelates the components of a process within a conceptual framework, insuring continous, orderly, and effective progress toward a stated goal. (Heinich)

3. (system as design-process) The sum total of parts working independently and working together to achieve required results or outcomes. (Kaufman)

4. (system as solution) An integrated, programmed complex of instructional media, machinery and personnel whose components are structured as a single unit with a schedule of time and sequential phasing. (DAVI, 1963) (above definitions of "systems" from AECT, Task Force on Definition and Terminology, 1979, pp. 23 - 24)

system(s) approach - 1. A process for effectively and efficiently achieving a required outcome based on documented needs; a form of logical problem-solving akin to the scientific method; a process by which needs are indentified, or problems are selected, requirements for problem solution are selected from alternatives, methods, and means are obtained and implemented, results are evaluated, and required revisions to all or part of the system are made so that the needs are eliminated. (Kaufman in AECT, Task Force on

	Definition and Terminology, 1979, pp. 24-25)
teleological	- directed toward a definite end or having an ultimate purpose. (from Webster's, 1980, p. 1461)
throughput	- in an open system, the conversion of energy input into forms more suitable to the needs of the system. (from Davies, 1976, p. 284.)

APPENDIX B

DIRECTIONS FOR COMPLETION OF THIS SURVEY:

The survey is divided into two main sections.

In SECTION A, you are asked to indicate the extent to which certain instructional development (ID) behaviors are practiced in your organization AND to indicate the extent to which you believe these behaviors should be practiced under "ideal circumstances." The following five-point scale is utilized:

0 = the behavior is never practiced
25 = the behavior is practiced about 25% of the time
50 = the behavior is practiced about 50% of the time
75 = the behavior is practiced about 75% of the time
100 = the behavior is always practiced

For each item in SECTION A, please remember to respond in terms of BOTH your organization AND in terms of "ideal circumstances." If your response would fall between two percentages, please choose the response which you believe would most closely represent your desired response. CIRCLE your responses.

SECTION B asks for certain demographic data. Please write the NUMBER of your response to each item in the box to the right of that item.

* * * Please respond to ALL ITEMS to the best of your ability. * * *

Thank you very much for your valuable time and effort.

BEST COPY AVAILABLE

For Admin. Use Only: ☐ ☐ ☐ ☐

SECTION A: The Instructional Development Process

For each item (1-26), please CIRCLE the number under the column entitled "The ID Process as practiced in MY ORGANIZATION" which best represents the percentage of time that particular behavior is actually practiced in your organization, AND, then, CIRCLE the number under the column entitled "The ID Process as practiced under IDEAL CIRCUMSTANCES" which best represents the percentage of time that you feel that particular behavior should be practiced (under ideal circumstances).

The ID Process as practiced in MY ORGANIZATION	**BEHAVIOR**	**The ID Process as practiced under IDEAL CIRCUMSTANCES**
Percentage of Time Practiced		**Percentage of Time Practiced**
0 25 50 75 100	1. An assessment is made of constraints (e.g., fiscal, personnel, time) relevant to the development of instruction before any actual development of instruction begins.	0 25 50 75 100
0 25 50 75 100	2. Once the personnel who will work on a given ID project have been selected, they are "updated" on the progress made thus far on that project.	0 25 50 75 100
0 25 50 75 100	3. I am the person who makes others in my organization aware of instructional needs in the organization.	0 25 50 75 100
0 25 50 75 100	4. Data on a client's instructional needs are systematically analyzed.	0 25 50 75 100
0 25 50 75 100	5. Proposed instruction is first outlined and reviewed with both the ID personnel and the ID client before the actual development work begins.	0 25 50 75 100

The ID Process as practiced in MY ORGANIZATION	BEHAVIOR	The ID Process as practiced under IDEAL CIRCUMSTANCES
Percentage of Time Practiced		Percentage of Time Practiced
0 25 50 75 100	6. The entry level behaviors (including knowledge and skills) of learners are assessed before development of instruction begins.	0 25 50 75 100
0 25 50 75 100	7. Whoever has the responsibility of developing instruction selects the ID personnel who will work on that project.	0 25 50 75 100
0 25 50 75 100	8. Prior to the actual development of instructional materials, the scope of instruction (re: number of learners, time required for instruction, and content parameters) is clearly established for that instruction.	0 25 50 75 100
0 25 50 75 100	9. Instructional media (e.g., films, textbooks, audiotape) are selected based on their relevance to one or more learning event (instructional activity).	0 25 50 75 100
0 25 50 75 100	10. Course materials are selected from more than one source based on an analysis of instructional needs.	0 25 50 75 100
0 25 50 75 100	11. Instructional needs are clearly differentiated from other organizational needs (e.g., communication difficulties or management problems).	0 25 50 75 100
0 25 50 75 100	12. The actual location where the instruction will be utilized (e.g., classroom, an assembly line, the cockpit of a new aircraft) is visited by at least one member of the ID team (or the ID person, if only one person is involved) prior to the actual development of instructional materials.	0 25 50 75 100
0 25 50 75 100	13. Instructional objectives are stated in behavioral terms.	0 25 50 75 100

The ID Process as practiced in MY ORGANIZATION	BEHAVIOR	The ID Process as practiced under IDEAL CIRCUMSTANCES
Percentage of Time Practiced		Percentage of Time Practiced
0 25 50 75 100	14. The types of learning required in the instruction are analyzed in terms of some specified "taxonomy" of levels of learning (e.g., Bloom, Gagné, etc.).	0 25 50 75 100
0 25 50 75 100	15. Remedial instruction is available to learners who need it.	0 25 50 75 100
0 25 50 75 100	16. Learner achievement is measured (tested) after instruction has been completed.	0 25 50 75 100
0 25 50 75 100	17. Provisions are made in the development of instruction for individual differences among learners.	0 25 50 75 100
0 25 50 75 100	18. Small segments of the instruction are evaluated in order to correct deficiencies (i.e., formative evaluation).	0 25 50 75 100
0 25 50 75 100	19. The entire instructional product is evaluated in order to determine its effectiveness.	0 25 50 75 100
0 25 50 75 100	20. Instruction is modified to meet changing needs.	0 25 50 75 100
0 25 50 75 100	21. Learners are evaluated in relation to some predetermined criteria.	0 25 50 75 100
0 25 50 75 100	22. Feedback from learners regarding the instruction is obtained for making possible modifications in the instruction.	0 25 50 75 100
0 25 50 75 100	23. Evaluation measures (tests) are directly keyed to the stated objectives of the instruction.	0 25 50 75 100
0 25 50 75 100	24. The environment(s) in which the instruction takes place is (are) selected based on suitability for achieving the objectives of the instruction.	0 25 50 75 100

The ID Process as practiced in MY ORGANIZATION	BEHAVIOR	The ID Process as practiced under IDEAL CIRCUMSTANCES
Percentage of Time Practiced		Percentage of Time Practiced
0 25 50 75 100	25. Staff and management controls for the ID process are established through utilization of some specified technique (e.g., PERT, PPBS, flow charting, decision tables, etc.).	0 25 50 75 100
0 25 50 75 100	26. Instructors are trained before they interact with learners.	0 25 50 75 100

SECTION B: Demographic Data

For items 27 through 32, please write the NUMBER of your response in the box to the right of each item.

27. In what type of organization do you work?

    1. College, University or other educational institution
    2. Business or Industrial organization
    3. Military
    4. Government
    5. Other (Please specify: __________________________)

27. ☐

28. How long have you been actively working in the development of instruction?

    1. less than one year
    2. 1-2 years
    3. 3-5 years
    4. 6-10 years
    5. more than 10 years

28. ☐

29. Please indicate the highest level of formal education which you have attained thus far.

    1. pre-college level
    2. baccalaureate degree
    3. master's degree
    4. doctorate
    5. post-doctorate studies

29. ☐

30. In how many professional organizations (related to the development of instruction) do you currently hold membership?

1. none
2. one
3. two
4. three
5. more than three

30. ☐

31. How long do you plan to stay in the field of ID (given the choice)?

1. less than one year
2. 1-3 years
3. 4-6 years
4. at least 7 years, but not necessarily for the balance of my career
5. for the balance of my career
6. undecided

31. ☐

32. Do you wish to receive the results of this survey?

1. Yes
2. No

32. ☐

**** HAVE YOU RESPONDED TO ALL ITEMS? ****

Thank you for responding to my survey.

APPENDIX C

408 Linden Avenue
East Aurora, N.Y. 14052
April 9, 1982

Dear Fellow ID Professional:

As a fellow professional in the field of instructional development, you are probably aware that current practices in developing instruction vary greatly from institution to institution, from practitioner to practitioner, and even from situation to situation. Surely, we all share the same underlying goal -- to bring about more successful learning in those who experience our instruction!

But... How do we go about trying to achieve that goal? What are our ID colleagues doing? How do other practices differ from our own? What can be learned from discovering what our fellow ID professionals are up to?

Clearly, research toward answering these questions would be of tremendous benefit to all of us in the ID profession. This survey is a vital dimension of such research.

In addition to being an instructional developer, I am also conducting research on current practices in instructional development as part of my doctoral dissertation at the State University of New York at Buffalo.

Seven hundred and fifty ID professionals in both business and higher education from all over the United States will receive this survey.

You, as one of these professionals, can provide valuable current information for this research toward a better understanding of (and improvement of) the ID profession and its practices.

The survey is comprised of two main sections. Section A is a series of statements of activities which may be carried out in the process of designing, implementing and evaluating instruction. Section B asks for some basic demographic information.

Please be assured that your responses will be held in the STRICTEST CONFIDENCE and will be COMPLETELY ANONYMOUS. I am interested only in the results obtained from all respondents as a group, not in any individual responses.

You have been assigned a code number so that accurate records can be kept on response rates -- and so that I can send you a "reminder" if your response doesn't come back fairly soon!

Since I am asking you to do me a favor, I will offer to do one for you. If you would like to be informed of the results of this survey (Remember: grouped data only!), simply let me know by your response to the last question. The results will be made available to you as soon as possible (hopefully, Fall 1982).

A self-addressed, stamped envelope is enclosed for your convenience in sending me your response.

***PLEASE FORWARD ON OR BEFORE APRIL 23, 1982 ***

Thank you in advance for you contribution to the ID profession.

Robert F. Sullivan

April 30, 1982

Dear Fellow ID Professional:

The enclosed survey (and attached cover letter) on the instructional development process was mailed to you in early April. To date, several hundred responses have come in from ID professionals in both business and education from all over the United States.

Since I have not received your response yet, I thought I'd send you another copy of my survey. I know how busy you must be -- especially this time of the year. But YOUR response is extremely important to me. You're worth the effort and expense of sending this follow-up.

If you have already mailed your response, please accept my sincere thanks -- and my assurance that you will receive the results as soon as possible. If not, won't you please complete and return my survey on or before MAY 14th?

Thanks for your help.

Robert F. Sullivan

RFS:des

408 Linden Avenue
East Aurora, N.Y. 14052
May 22, 1982

Dear Fellow ID Professional:

HELP!

Early in April, you received my research survey on current practices in instructional development. Early in May, you received a follow-up letter with an additional copy of the survey. To date, I have not received your response.

Possibly my survey never reached you. Possible you have not been available for the past month for some reason. Maybe you simply do not want to respond to my survey.

Whatever the case, please let me know. If you do need another copy of my survey, please let me know that, also. Time is pressing. I must begin my analysis soon. Also, since mailing costs are so high, my budget tells me that this letter will probably be my last chance to obtain your response. And I want your input very much!

Please use the enclosed, stamped return envelope to let me know your situation by checking one of the following boxes.

Thank you.

☐ I already returned your survey!

☐ O.K. O.K. I'll do it. I already have a copy.

☐ I'll respond, but I will need a copy of your survey. Please send it to the following address:

____

____

____

☐ I do not intend to respond your survey. (COULD YOU TELL ME WHY?)

If a phone call would help, please call me at one of the following numbers:

Office	(716) 842-4863 842-5389	Mon. - Fri. 9-5
Home	(716) 655-1793	Any time other than office hours

Robert F. Sullivan

APPENDIX D

Table A

Correlation Matrix of Demographic and ID Behavior Survey Items

ITEM	CODE	DM01	DM02	DM03	DM04	DM05	DM06	AV01	AV02	AV03
CODE	1.00									
DM01	-.61	1.00								
DM02	.16	-.09	1.00							
DM03	.45	-.26	.34	1.00						
DM04	.22	-.13	.25	.30	1.00					
DM05	.12	-.08	.23	.10	.08	1.00				
DM06	.04	-.07	-.06	.02	-.12	-.08	1.00			
AV01	-.01	.01	-.06	-.05	-.03	.04	-.03	1.00		
AV02	-.04	.02	.10	.02	.03	.06	-.09	.32	1.00	
AV03	-.20	.15	.01	-.11	.02	-.03	-.10	.09	.10	1.00
AV04	.05	-.04	.13	.08	.14	.04	-.02	30	.21	.14
AV05	.15	-.12	.06	.12	.14	.09	-.08	.28	.41	.08
AV06	.01	.01	.12	.03	.12	.01	-.01	.19	.20	.14
AV07	-.08	.12	.01	-.07	-.10	-.01	-.10	.20	.28	.21
AV08	.01	.05	-.04	-.03	.02	.05	-.11	.29	.29	.14
AV09	-.05	.02	-.01	-.08	-.05	.05	-.02	.15	.24	.05
AV10	-.05	.05	.05	-.04	-.04	.06	-.05	.12	.18	.08
AV11	.03	-.03	-.01	-.02	.02	.07	-.03	.20	.23	.07
AV12	-.05	.01	.03	.01	-.01	-.07	-.15	.13	.25	.17
AV13	-.10	.16	.09	-.03	.06	.07	-.06	.20	.22	.06
AV14	.16	-.06	.14	.09	.22	.07	-.09	.22	.08	.01
AV15	.03	.02	.09	.04	.09	.09	-.08	.07	.23	.08
AV16	.24	-.15	.17	.09	.12	.22	-.02	.18	.11	.06
AV17	-.08	.09	.09	-.05	.09	.10	-.08	.14	.10	.04
AV18	.01	-.04	.01	-.01	-.02	.04	-.01	.17	.20	-.03
AV19	-.03	.03	-.06	-.01	-.01	-.01	-.05	.19	.20	.01
AV20	-.17	.12	-.07	-.15	-.15	-.06	.01	.15	.24	.10
AV21	.10	-.07	.07	.10	.13	.14	-.03	.23	.10	.02
AV22	-.18	.10	-.08	-.10	-.10	-.02	.01	.14	.17	.04
AV23	.01	.04	.04	-.04	.06	.13	-.02	.18	.17	-.01
AV24	-.19	.11	.04	-.08	-.11	.06	-.11	.22	.22	.08
AV25	.04	-.06	.12	.07	.13	.01	-.06	.19	.21	.01
AV26	-.32	.25	-.07	-.14	-.14	.03	-.11	.15	.19	.14

Table B

Correlation Matrix of Demographic and ID Behavior Survey Items

ITEM	CODE	DM01	DM02	DM03	DM04	DM05	DM06	AV01	AV02	AV03
IV01	-.01	.03	-.03	-.06	.01	.08	-.06	.45	.10	.01
IV02	-.03	-.03	.08	.03	-.03	-.01	-.13	.17	.48	-.02
IV03	-.06	.06	-.03	-.11	.01	-.02	-.06	.06	-.01	.69
IV04	.02	.01	.14	.06	.04	.03	-.05	.14	.09	.09
IV05	.13	-.11	.03	.11	.03	.07	-.06	.10	.19	-.04
IV06	.08	-.07	.10	.02	.10	.05	-.02	.10	.08	-.01
IV07	-.10	.13	.07	-.02	-.05	.02	-.07	.09	.11	.19
IV08	.01	-.02	.07	.07	.04	.11	-.16	.17	.16	.09
IV09	.01	.02	.07	-.01	-.03	.12	-.06	.11	.19	.06
IV10	.02	.02	-.02	-.01	.01	.04	-.03	.02	.08	.10
IV11	.01	-.04	.03	-.01	.06	.03	.02	.05	.11	-.02
IV12	.08	-.12	.06	.09	.02	-.02	-.06	.04	.07	.11
IV13	-.15	.11	.12	-.09	-.03	-.01	-.07	.07	.10	.06
IV14	.14	-.08	.16	.16	.17	.06	-.05	.06	.04	-.01
IV15	.14	-.06	.14	.09	.04	.05	-.05	.08	.14	.04
IV16	.09	-.08	.14	.09	.08	.17	-.17	.15	.09	.08
IV17	.05	-.01	.17	.02	.12	.15	-.15	.14	.04	.03
IV18	.14	-.11	.07	.06	-.01	.16	-.05	.12	.17	-.01
IV19	.05	-.02	-.01	.09	.01	-.03	-.09	.21	.20	.02
IV20	-.12	.07	-.02	-.05	-.10	-.04	-.07	.19	.17	.12
IV21	.09	-.16	.11	.13	.07	.06	-.07	.17	.15	.02
IV22	-.01	-.02	.03	.03	-.04	.07	-.06	.19	.16	.11
IV23	.11	-.03	.01	.11	-.05	.03	-.07	.11	.13	-.02
IV24	.01	.03	.05	.04	-.08	.07	-.12	.19	.15	.09
IV25	.08	-.06	.07	.09	.05	.01	-.07	.05	.04	.01
IV26	-.20	.10	-.03	-.06	-.08	.01	-.06	-.01	.07	.06

Table C

Correlation Matrix of Demographic and ID Behavior Survey Items

ITEM	AV04	AV05	AV06	AV07	AV08	AV09	AV10	AV11	AV12	AV13
AV04	1.00									
AV05	.49	1.00								
AV06	.41	.27	1.00							
AV07	.20	.19	.21	1.00						
AV08	.30	.31	.30	.32	1.00					
AV09	.19	.20	.22	.29	.28	1.00				
AV10	.19	.20	.16	.23	.31	.49	1.00			
AV11	.31	.24	.33	.26	.28	.21	.23	1.00		
AV12	.28	.23	.25	.25	.29	.19	.15	.25	1.00	
AV13	.37	.28	.34	.17	.28	.33	.32	.29	.28	1.00
AV14	.39	.33	.37	.14	.20	.11	.19	.23	.19	.43
AV15	.24	.23	.30	.08	.19	.09	.08	.20	.21	.23
AV16	.32	.18	.27	.06	.24	.09	.06	.23	.12	.26
AV17	.33	.14	.36	.18	.19	.30	.29	.28	.23	.27
AV18	.35	.28	.33	.18	.22	.27	.27	.26	.18	.34
AV19	.33	.21	.37	.19	.27	.27	.25	.33	.22	.41
AV20	.24	.19	.28	.30	.35	.32	.43	.23	.25	.33
AV21	.42	.24	.40	.15	.27	.17	.17	.34	.16	.41
AV22	.21	.16	.17	.24	.27	.33	.33	.24	.29	.36
AV23	.39	.27	.31	.18	.28	.28	.27	.33	.22	.52
AV24	.28	.18	.29	.24	.33	.29	.23	.27	.29	.29
AV25	.37	.24	.34	.15	.22	.11	.11	.24	.18	.32
AV26	.20	.06	.22	.21	.28	.29	.31	.31	.29	.40
IV01	.12	.21	.06	.05	.15	.06	.05	.05	.05	.07
IV02	.14	.23	.01	.21	.16	.07	.11	.13	.13	.08
IV03	.06	.01	.04	.08	.07	-.03	.05	.01	.01	-.02
IV04	.43	.14	.05	.11	.06	.04	.05	.11	.16	.07

Table D

Correlation Matrix of Demographic and ID Behavior Survey Items

ITEM	AV04	AV05	AV06	AV07	AV08	AV09	AV10	AV11	AV12	AV13
IV05	.16	.53	-.01	-.02	.15	.02	.07	-.04	.05	.03
IV06	.12	.13	.45	.02	.09	.11	.07	.05	.02	.03
IV07	.21	.16	.08	.60	.16	.15	.17	.18	.20	.14
IV08	.17	.26	.14	.12	.54	.08	.09	.08	.12	.06
IV09	.14	.16	.12	.05	.13	.48	.25	.01	.03	.11
IV10	.04	.06	.01	.10	.12	.26	.49	.05	.01	.09
IV11	.10	.10	.05	.06	.06	.02	.04	.42	.01	.08
IV12	.19	.16	.15	.08	.13	.06	.08	.10	.69	.11
IV13	.07	.04	.13	.06	.09	.06	.08	.01	.13	.48
IV14	.22	.22	.17	.03	-.03	-.03	.01	.04	.06	.23
IV15	.18	.17	.10	.01	.05	-.02	.01	.06	.22	.11
IV16	.19	.10	.04	.02	.11	-.04	.01	.08	.10	.13
IV17	.21	.10	.19	.11	.09	.04	.08	.09	.15	.11
IV18	.25	.21	.22	.09	.08	.14	.09	.11	.14	.22
IV19	.17	.16	.11	.16	.12	.19	.09	.03	.10	.17
IV20	.15	.14	.08	.13	.17	.20	.20	.01	.11	.25
IV21	.19	.18	.14	.02	.05	.01	.04	.10	.09	.16
IV22	.15	.14	.02	.10	.15	.16	.19	.07	.12	.15
IV23	.14	.14	.03	.02	.10	.03	.08	.02	.13	.24
IV24	.22	.14	.16	.21	.16	.27	.15	.18	.15	.18
IV25	.16	.06	.12	.03	.03	-.01	-.05	.05	.11	.10
IV26	.02	-.02	.10	.03	.07	.10	.12	-.02	.10	.16

Table E

Correlation Matrix of Demographic and ID Behavior Survey Items

ITEM	AV14	AV15	AV16	AV17	AV18	AV19	AV20	AV21	AV22	AV23
AV14	1.00									
AV15	.32	1.00								
AV16	.27	.38	1.00							
AV17	.23	.35	.33	1.00						
AV18	.29	.23	.30	.31	1.00					
AV19	.34	.19	.18	.26	.50	1.00				
AV20	.21	.21	.12	.31	.41	.45	1.00			
AV21	.36	.34	.58	.33	.41	.36	.25	1.00		
AV22	.24	.06	.13	.26	.40	.46	.46	.27	1.00	
AV23	.36	.31	.48	.39	.37	.38	.29	.58	.33	1.00
AV24	.21	.23	.19	.28	.30	.27	.34	.24	.33	.29
AV25	.39	.27	.31	.20	.24	.30	.18	.39	.17	.34
AV26	.16	.18	.09	.28	.36	.36	.48	.25	.44	.28
IV01	.19	.17	.13	.13	.08	.07	.06	.16	.07	.16
IV02	.01	.08	.03	.06	.12	.13	.12	.09	.11	.08
IV03	-.02	.06	.01	-.02	-.11	-.11	.02	.02	-.07	-.03
IV04	.12	.11	.11	.07	.07	.03	.06	.09	.09	.14
IV05	.12	.09	.06	-.06	.02	-.01	.01	.06	.03	.10
IV06	.16	.15	.08	.13	.10	.04	.06	.12	.01	.06
IV07	.12	.10	.04	.11	.14	.09	.19	.05	.18	.12
IV08	.11	.13	.11	.04	.06	.12	.15	.07	.03	.12
IV09	.05	.03	-.02	.01	.07	.08	.11	.01	.11	.06
IV10	-.01	.03	.01	.10	.05	.10	.22	-.01	.07	.05
IV11	.05	.08	.09	.09	.04	.04	-.03	.09	.03	.13
IV12	.06	.15	.13	.11	.08	.10	.03	.05	.10	.10
IV13	.18	.09	.03	.03	.02	.05	.16	.10	.11	.15
IV14	.60	.21	.11	-.01	.02	.08	-.01	.13	.01	.13
IV15	.16	.53	.19	.12	.11	.01	.01	.11	.02	.16
IV16	.14	.17	.45	.15	.06	.01	-.06	.21	.03	.21

Table F

Correlation Matrix of Demographic and ID Behavior Survey Items

ITEM	AV14	AV15	AV16	AV17	AV18	AV19	AV20	AV21	AV22	AV23
IV17	.13	.21	.24	.47	.09	.05	.03	.12	.11	.17
IV18	.20	.15	.21	.15	.54	.18	.17	.21	.17	.21
IV19	.13	.09	.05	.08	.16	.35	.18	.11	.15	.15
IV20	.08	.07	.08	.13	.16	.19	.37	.08	.26	.15
IV21	.15	.14	.23	.10	.07	.06	.02	.41	.11	.23
IV22	.12	.02	.13	.10	.16	.12	.13	.11	.46	.19
IV23	.16	.17	.21	.08	.10	.08	.06	.27	.16	.43
IV24	.12	.08	.10	.12	.09	.12	.09	.10	.18	.13
IV25	.20	.14	.14	.03	-.01	.04	-.06	.09	-.03	.12
IV26	.04	.06	.01	.08	.05	.02	.15	.09	.16	.11

Table G

Correlation Matrix of Demographic and ID Behavior Survey Items

ITEM	AV24	AV25	AV26	IV01	IV02	IV03	IV04	IV05	IV06	IV07
AV24	1.00									
AV25	.31	1.00								
AV26	.41	.16	1.00							
IV01	.11	.08	.08	1.00						
IV02	.19	.09	.12	.29	1.00					
IV03	.04	.02	.04	.02	-.06	1.00				
IV04	.15	.15	.14	.25	.22	.09	1.00			
IV05	.09	.07	-.07	.33	.37	.02	.26	1.00		
IV06	.16	.12	.03	.26	.14	-.01	.24	.26	1.00	
IV07	.18	.07	.14	.10	.23	.17	.27	.07	.08	1.00
IV08	.15	.15	.19	.29	.32	.06	.20	.40	.24	.19
IV09	.12	.05	.13	.18	.21	.05	.23	.24	.30	.17
IV10	.09	.02	.20	.11	.21	.11	.25	.15	.11	.16
IV11	.06	.06	.04	.21	.31	.03	.23	.19	.20	.16
IV12	.15	.03	.10	.09	.21	.05	.18	.17	.15	.18
IV13	.22	.08	.24	.13	.21	.01	.20	.14	.21	.10
IV14	.07	.23	.01	.21	.14	-.03	.22	.23	.24	.16
IV15	.08	.09	.01	.20	.19	.08	.24	.27	.28	.17
IV16	.11	.13	.04	.26	.19	.06	.20	.17	.18	.13
IV17	.11	.13	.10	.24	.23	-.02	.21	.16	.31	.18
IV18	.17	.14	.19	.23	.28	-.11	.20	.19	.27	.13
IV19	.14	.16	.16	.27	.28	-.05	.17	.23	.19	.22
IV20	.14	.07	.28	.25	.32	.03	.22	.23	.18	.19
IV21	.10	.17	.11	.31	.27	.07	.29	.34	.31	.10
IV22	.13	.04	.20	.27	.29	.01	.27	.20	.18	.23
IV23	.10	.18	.10	.32	.26	-.02	.26	.32	.19	.12
IV24	.45	.17	.20	.23	.24	.03	.31	.21	.33	.23
IV25	.14	.57	.06	.19	.17	.01	.30	.22	.24	.12
IV26	.16	.06	.48	.14	.15	-.01	.11	.05	.19	.01

Table H

Correlation Matrix of Demographic and ID Behavior Survey Items

ITEM	IV08	IV09	IV10	IV11	IV12	IV13	IV14	IV15	IV16	IV17
IV08	1.00									
IV09	.29	1.00								
IV10	.20	.37	1.00							
IV11	.19	.17	.17	1.00						
IV12	.17	.08	.09	.14	1.00					
IV13	.20	.15	.13	.11	.14	1.00				
IV14	.21	.15	.04	.14	.12	.31	1.00			
IV15	.15	.14	.09	.17	.31	.21	.33	1.00		
IV16	.23	.14	.01	.16	.23	.21	.26	.35	1.00	
IV17	.20	.15	.17	.24	.25	.19	.24	.36	.34	1.00
IV18	.17	.23	.13	.15	.18	.24	.25	.29	.27	.32
IV19	.28	.27	.17	.17	.16	.21	.20	.21	.23	.27
IV20	.31	.35	.25	.17	.14	.32	.23	.23	.26	.29
IV21	.25	.19	.12	.19	.22	.34	.30	.28	.38	.29
IV22	.27	.37	.27	.14	.19	.23	.18	.19	.26	.29
IV23	.24	.22	.12	.16	.18	.38	.25	.33	.42	.21
IV24	.23	.38	.27	.18	.20	.28	.20	.25	.19	.25
IV25	.25	.17	.08	.12	.14	.25	.43	.26	.26	.27
IV26	.21	.17	.17	.08	.16	.37	.10	.11	.16	.17

Table I

Correlation Matrix of Demographic and ID Behavior Survey Items

ITEM	IV18	IV19	IV20	IV21	IV22	IV23	IV24	IV25	IV26
IV18	1.00								
IV19	.32	1.00							
IV20	.37	.48	1.00						
IV21	.27	.19	.25	1.00					
IV22	.35	.35	.49	.35	1.00				
IV23	.27	.29	.34	.49	.45	1.00			
IV24	.28	.29	.29	.23	.35	.28	1.00		
IV25	.21	.23	.19	.31	.17	.35	.33	1.00	
IV26	.21	.20	.36	.26	.29	.24	.28	.20	1.00